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PROCEEDINGS OF THE CHIEF CONSERVATOR OF FORESTS
No. 311, PRESS, DATED THE 8TH JULY 1932

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REVISED WORKING PLAN

FOR THE

GHUMSUR FORESTS, GANJAM DISTRICT

PREPARED BY

M. KESAVANUNNI NAYAR,
Deputy Conservator of Forests
(under the direction of C. C. WILSON, Conservator of Forests, Working Plans Circle)

1930-31 TO 1939-40

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INTRODUCTION.

Up to 1900, the Ghumsur forests were not managed in accordance with sound silvicultural principles. Overexploitation, fires and grazing had turned the forests to a deplorable state. The first working plans drawn up by Messrs. S. Cox, C. E. C. Fischer and F. L. C. Cowley-Brown were introduced in the years 1903 to 1905. Mr. Cox's plan covered the present Russellkonda, Mojjagoda, Kukuluba and Bontha ranges and it was subsequently amplified by Mr. Fischer. Mr. Cowley-Brown's plan dealt with the Buguda and Surada ranges. The main prescriptions of these plans were the termination of the permit system, introduction of systematic fire protection, regulation of grazing, demarcation of sal blocks, improvement of communications and closure of the forests generally for a period of rest. In 1914, Messrs. Cox and Fischer's plans came to an end and in 1915 an interim working plan for the whole of the Ghumsur forests was prepared by Mr. A. A. F. Minchin for carrying on the management until a detailed and scientific plan was ready. At the same time Mr. Minchin commenced the compilation of the current Ghumsur working plan and completed it in March 1920. But its prescriptions began to be applied from April 1919.

2. For the revision of Mr. Minchin's Working plan, the writer was appointed as a Working Plans officer on 23rd September 1927 with one clerk as his staff. At that time, forest work in Ganjam had become disorganized owing to the intensive exploitation for the Russellkonda Saw Mill and the District Forest office records were in great confusion. The only Control record maintained for Mr. Minchin's Working plan was the 'Control Journal' and even the posting of it was two years in arrears. The Working plans officer was therefore ordered to collect the control figures from the seven Range offices, for all the preceding years and post them afresh in appropriate forms. This preliminary work engaged him till the end of January 1928. Until January 1929, field work was carried out with the assistance of only one ranger. In January and March 1929, one forester and one Supernumerary ranger were added to the field staff, making the total strength of staff to three. The field work which covered the whole area of some 600 square miles of the Ghumsur forests was completed in the latter half of July 1930. The compilation of the working plan and the preparation of the 4-inch stockmaps consisting of 48 sheets as well as the 1-inch key map were then undertaken from August 1930 and the whole work was completed on 28th February 1931.

3. In the compilation of Part I, it has been found that a great deal of the information contained in Mr. A. F. Minchin's Working Plan of 1919 is still applicable and certain passages could not be improved upon; in such cases extensive quotations have been made from that working plan, and they have been denoted by an asterisk at the beginning of each passage, and by enclosing it in inverted commas.

4. The following staff assisted the Working Plans officer in the field work and in the preparation of the working plan as well as the maps:—

(1) Ranger J. D. David from 5th April 1928 to 28th February 1931.

(2) Supernumerary Ranger Y. Vydyanatham from 7th March 1929 to 31st January 1930 and from 23rd February 1930 to 28th February 1931.

(3) Forester S. M. Ansar Ali from 26th January 1929 to 25th October 1930.

Forester Y. V. Anjaneyulu from 26th October 1930 to 28th February 1931.

(4) Acting Clerk Jogaindranath Dass from 27th September 1927 to 30th September 1928.

Acting Clerk Banchhanidhi Panigrahi from 23rd November 1928 to 28th February 1931.

(5) Temporary Draughtsman T. Jagannath Achary from 15th September 1930 to 28th February 1931.

The Working Plans officer had the benefit of two years' previous experience of the Ghumsur forests when he undertook the revision and the two rangers had served in the division for several years.

BERHAMPUR-GANJAM,
The 28th February 1931.

M. K. NAYAR,
Working Plans Officer, Ganjam.

PART I.

[*Note*—All passages marked with an asterisk are quotations from Mr. A. F. Minchin's Working Plan of 1919—vide paragraph 3 of Introductory note.]

Summary of facts on which the proposals are based.

CHAPTER I.—THE TRACT DEALT WITH.

SECTION I.—NAME AND SITUATION.

1. *Ganjam district.*—Ganjam district is the northernmost part of the Madras Presidency and stretches along the sea coast of the Bay of Bengal. It is bounded on the north by Baud Feudatory State, Angul district, Daspalla and Niagarh Feudatory States and Puri district all within the Province of Bihar and Orissa. On the east is the Bay of Bengal and on the south is Vizagapatam district. On the west are Vizagapatam district, Kalahandy Feudatory State and Patna district of Bihar and Orissa. The area of the district is 8,383 square miles. It is divided into four revenue divisions namely Ghumsur, Chatrapur, Berhampur and Chicacole besides the Agency hill tracts which are administered by the Collector acting in the capacity of the Agent to the Governor in Ganjam. Within the district there are numerous Zamindars who own forests of their own. The headquarters of the Collector and of the District Forest Officer is at Chatrapur situated on the sea coast.

2. *Ghumsur Forests.*—The area covered by this Working Plan is some 600 square miles and goes by the name of the Ghumsur forests. These forests form the most densely wooded part of Ganjam district and are concentrated at the extreme north in Ghumsur revenue division.

3. *Geographical position.*—The Ghumsur forests lie within 19° 30′ and 20° 30′ North Latitude and 84° and 85° Longitude east of Greenwich.

4. *Distribution.*—The forests of Ghumsur are distributed among seven ranges—Russellkonda, Mojjagoda, Kukuluba, Bontha, Buguda, Surada and Pondakhol. Besides these ranges, the District Forest Officer, Ganjam, is also in charge of the isolated Berhampur Range and the Balliguda Agency. The Mohiri hills situated a few miles from the sea coast constitute the Berhampur Range. They are covered with scrub jungle or bamboo and worked under the prescriptions of the simple Working Plan of 1915 which was prepared by Mr. A. F. Minchin. In the Balliguda Agency steps are being taken to introduce forest reservation. The centre of the Ghumsur forests may be taken to be Russellkonda, which is the headquarter station of the Ghumsur Revenue Division. The forests lie within a radius of 30 miles from Russellkonda.

SECTION 2.—CONFIGURATION OF THE GROUND.

5. *General Features.*—* "The district is divided in half by the Eastern Ghauts running roughly north and south. Between the Ghauts and the sea coast are plains containing the administrative divisions. Behind the ghauts are high lands with a general altitude of 1,500 feet. The high lands are known politically as the agency and are administered in a somewhat paternal manner by the Collector of the district.

"The Eastern Ghauts (or else detached hill ranges belonging to the ghauts) almost enclose Ghumsur. The hill outline is interrupted on the south and south-east. The crest of the main ghauts on the west and north is generally speaking the dividing line between the Agency and Ghumsur. Most of the reserves are on the slopes of the ghauts. Pondakhol Range is within the Agency but not on the Agency plateau proper ; likewise the Chokkapad reserve of Mojjagoda Range. The rest of the forests are within Ghumsur.

"The Ghumsur division is fringed with hills. It contains ridges of the main range as well as isolated hills. The ghauts formed of a belt of parallel interrupted ridges and irregularly scattered hills attain in this locality an elevation of about 3,000 feet. They are the remnants of an ancient and once lofty mountain range contemporary with the Aravallis and hills of Central India."

6. *Elevation.*—The plains of Ghumsur are situated at a distance of about 50 miles from the sea and have an elevation of 300 to 400 feet. The hills usually rise to elevations varying from 1,000 to 3,000 feet. The highest peaks are Khondabala, 3,115 feet in Kriamba reserve and Kutrubadi, 3,920 feet in Baiballi reserve.

7. *Drainage.*—The hills drain below into a net work of innumerable channels that run through the broken grounds of the plains. The small channels or 'nalos' unite into larger streams which ultimately pour into two rivers the Rushikulya on the west and the Mahanadi on the east. *" The two Ghumsur rivers unite near Aska 30 miles from the sea and flow into the Bay near Chatrapur. Their catchment area is about 1,800 square miles; the annual rainfall is 50 to 60 inches. Quite close to their sources the river beds are 300 to 400 feet only above the sea level. The rivers are useless as sources of power and for transport purposes. Most of the year they are represented by a narrow riband of water wandering over flat wide stretches of sandy river bed. Irrigation works have however been constructed by the Public Works Department. The reservoirs of Russellkonda and Surada and the excellent paddy lands below them are features of Ghumsur."

8. *Protection of the Rushikulya River.*—The Rushikulya river and its numerous distributaries constitute the principal irrigation system of the district. Its upper reaches are situated in the Pondakhol Reserve. The protection of the head waters of the Rushikulya is of immense importance.

9. *Beauty of the Country.*—* " The country is fertile and very beautiful. Hills clad in tree growth to their very tops, belts of splendid sal forests on their skirts. Broad cultivated valleys in which rainfed paddy is the chief crop and bamboo fringed streams. It is a country held in affection by those who have served in it."

SECTION 3.—GEOLOGY : ROCK AND SOIL.

10. *Geological Formation.*—* " The main foundation of the whole district is a mass of plutonic rock (rock that originated and crystallized out slowly, deep within the interior of the earth) granite, granitic gneiss and gneiss. After the original molten surface of the earth cooled down and formed the crust and apparently after the formation of sedimentary rocks had proceeded for some time on the surface, earth movements took place. These movements carried aloft parts of the plutonic complex and enfolded portions of the surface rocks. Next as a result of the earth movements combined with lateral crushing movements, some of the granites were converted into gneisses and even schists. (Schist is a metamorphic rock in which the foliae are finer than in gneiss.) Since then this part of the world has never been folded, disturbed or submerged beneath the ocean. Some of the plutonic rocks are amongst the earliest formations that geologists in India attempt to deal with. No trace of life has hitherto been found in these rocks.

11. *Granites and Gneisses.*—" The granites and gneisses vary in petrological characters, but the variations do not appear to be of practical importance. In 1898, Sir Thomas Holland gave to one series the general name of 'Charnockites.' They are recognizable as bold rocky hills, forest clad generally and strewn with big dark boulders. They are capped often by great domes of exfoliating rock and less often by precipitous castellated peaks. Essentially they consist of hypersthene, felspar, quartz and iron ores. The minerals that become available by their disintegration are silica, potassium oxide and iron oxide. They contain also small quantities of lime and magnesia.

12. *Crystalline Schists.*—" The crushing movment referred to above produced two classes of schist (*a*) The one class '*Orthoschist*' is derived from the crushing of plutonic rock. So far as the characterstics of the soil that it forms are concerned Orthoschist is similar to Charnokite. (*b*) The other class '*Paraschist*' is derived from the metamorphosis of sedimentary rocks. The paraschists weather and fracture more rapidly than the Orthoschists, Charnockites, granites and gneisses. Hills composed of them are now comparatively

on their last legs. They are recognizable most easily when encountered as unreserve hills, with smooth red soil-covered slopes, bearing generally low bushes or very inferior tree growth. The paraschists have often the appearance of sand stone. They contain belts of crystalline quartz, marble, etc. Lime is a substantial ingredient. Hence their importance, for the plutonic rocks contain practically no lime. The components of the paraschist are silica, felspar, iron oxide, white mica, graphite and lime in occasional bands.

13. *Trap Dykes.*—There are a few small dykes of volcanic rock (diorite), which are comparatively 'recent.' One may be seen at Mojjagoda and another near Janivalli on the Aska-Surada road. They are unimportant."

14. *Laterite.*—Three kinds of laterite may be distinguished.

(*a*) High level laterite occurs at elevations of about 2,000 feet resting on the schists, the rocks from which it was formed. On some of the schistose hills the laterite caps have weathered away.

(*b*) Low level laterite. These deposit are general throughout Ghumsur in open plains localities. They were formed during the disintegration of high level laterite. They lie between the main bed rocks and the present alluvium deposits. Owing to their impermeable character they are of no value to the growth of sal.

(*c*) Laterite detritus beds exist around the skirts of hills as gravel beds. They are composed of water rounded pebbles of high level laterite, mixed loosely with fragments of quartz, clay and other substances. Being permeable they are important from the forest point of view.

15. * " *Soils.*—The soils are derived, as has been shown, from gneissic and granitic rocks which cover about 92 per cent of Ghumsur at the present day; from schists which are less extensive now than they once were; and from high level laterite which originated on the schists.

16. " *Light sandy alluvium.*—Favourable to all tree growth. It occurs as belts and islands along the skirts of the hills at elevations of as much as 600 feet—far back in our main valleys—and down to 300 feet on the edges of the central Ghumsur plains. It is seldom more than 4 or 5 feet deep. In the medium quality sal forest which occurs on this good alluvium, the depth is generally less than 3′ 6″. It appears however that its depth is the principal factor that determines the quality of the sal trees. Many soil examination pits have been dug in the alluvium areas and it has been found that alluvium of 4 feet depth or more produces the 'first quality' sal that grows to heights of 90 to 120 feet; whilst shallower beds produce inferior qualities. There are doubtless other factors. At the side of the alluvial shelves where erosion has gone far we find the kankar bed and the soil from the disintegrated main rock exposed. Alluvial beds alternate thus with eroded tracts that are known as 'broken grounds.'

" Samples of alluvial soil from grounds bearing sal forest of distinctly different qualities have been examined by the soil expert of the Madras Agricultural College, Coimbatore. To the eye and to one's sense of touch these samples of alluvium are one and the same. The chemist pronounced the soils to be of laterite origin with debris of gneissic rocks. He drew attention particularly to the absence of lime to the consequent lack of phosphoric acid and to the accumulation of organic matter. There is no important difference in chemical contents between the surface soil specimens from the different qualities of sal ground. Mechanical analysis of soil gives sand 48·2 per cent and clay 51·8 per cent.

" The mechanical properties of soils are already known to be important. We find in practice that where the clay proportion is high, sal which is the important tree does not grow. Clay areas bear sparse tree growth though they are reported to be good agricultural soils."

17. *Examples of rich alluvium.*—Rich deposits of deep alluvium are found on broad river banks particularly in their bends; in Pippalaponka reserve on the banks of the Rushikulya some of the finest sal forests of magnificent proportions may be seen even at the present day.

18. * " *Red alluvial soil* known as 'Red earth.' It is not apparently very favourable to tree growth generally. It occurs in the central ground of wide alluvial deposits. It merges with the good sandy alluvium near the hill sides and is often of great depth. Judging by its colour one would conclude that it owes its origin to decomposition of laterite and paraschist rock. It is composed of fine sand cemented together by iron oxides.

19. " *Laterite gravel soil.*—It consists of more or less permeable clay, round pebbles of high level laterite detritus and angular fragments of disintegrated gneiss, etc. This bed occurs invariably under the good alluvium but does not appear to underlie red earth. It is also found on the surface over large areas. It is associated with spear grass, thorny scrub species and *Soymida febrifuga*. Young plants endeavouring to get their roots down through it exist in some precarious fashion. By itself it is evidently unfavourable to all plant life.

20. " *Soil formed from the bed-rock.*—The rock itself contains a very large proportion of felspar which appear to disintegrate easily. The resulting soil contains much stiff yellowish or grey kaolin and crumbly quartz fragments. On the plains it is exposed in broken grounds. It has generally on the surface a scattering of laterite gravel. There are different gradations of soil; sticky clay being conspicuous where there is least drainage. It ranges from black cotton soil to white magnesia and powdery felspar soil. It varies considerably according to its exposure to air and water. On the surface, the characteristic soil is a dull clay intermixed with nodules of lime.

" There are very many species that grow on the broken grounds. *Soymida febrifuga*, certain acacias and thorny scrub species, *Phyllanthus Emblica*, *Woodfordia floribunda* and *Anogeissus latifolia*. But only *Soymida* seems to be satisfied. Sal grows here and there in a forlorn way. The broken grounds are generally wildernesses, yet they contain good agricultural soil.

21. " *Hill side soil.*—Soil and sub-soil on hill sides are formed from the rock of the hill. We expect to find little soil on steep slopes and southerly aspects owing to sparse cover of tree growth and the more intense heat. On paraschist hill sides the soil is presumably unfertile; for the forest is always inferior though composed of the same species that frequent the gneissic hills. In the gneissic hills the soil is very good and the valuable species are found on all aspects provided there is a fair depth of properly drained soil. The best forest of all is found on well drained pockets of alluvium in small valleys in the hills; also on deep alluvium and detritus accumulations at the juncture of the hills and the plains."

22. *Erosion.*—There is unmistakable evidence of progressive erosion in the plains broken ground. Trees that once grew on deep soil are now stilted up on their naked roots. Some of them have lost their last hold on the soil and fallen down. Footpaths and cart-tracks that ran over perfectly even ground are now deeply cut up by water channels. Erosion is also noticeable on the borders of the alluvial shelves. It is proceeding slowly and no practical method of preventing it can be suggested.

Section 4—Climate.

23. *General.*—" The climate of Ghumsur is more characteristic of Central India than of the Madras coast and is not tempered by breezes from the sea. The extremes of heat and cold are considerable but frost is unknown. The south-west monsoon bursts about the middle of June and lasts with occasional breaks until the month of September or later. The north-east monsoon is expected to break about October, but is variable and usually cyclonic. Rain may usually be expected up to the second week of November after which the climate is cold bracing and rainless "—(*S. Cox.*)

* " The forests keep green until January. By the end of February almost every tree has shed its leaves and a new flush of leaves has appeared on the sal. In March the nights are still tolerably cool but the days are hot. At the end of March or in the first week of April, heavy thunder storms usually occur."

24. *Temperature.*—The temperature usually rises up to 112° Fahrenheit in the shade during May-June and often the maximum is reached just before the break of the south-west monsoon. In 1926 the Jail Superintendent recorded

115° Fahrenheit at Russellkonda on the 12th and 13th of June. This is the highest known in recent times and is an exception rather than the rule. The minimum temperature descends to about 55° in the latter part of December.

25. *Rainfall.*—At Russellkonda and Surada the two most important centres of forest region, rain-gauges have been maintained and read regularly by the Revenue Department. Statistics are available from 1870 to 1929. The average annual rainfall for the past 60 years is 52 inches at Russellkonda and 54 inches at Surada. The average for each ten-year period commencing from 1870 fluctuates between 47 and 68 inches. Only twice has the rainfall risen above 100 inches, in 1919 and 1929 at Surada. The lowest figure was recorded at Russellkonda, being only 29 inches in 1918, which led to wide spread famine in the following year. The highest rainfall recorded is 130 inches at Surada in 1919. Taking the average to be about 54 inches the rainfall is distributed approximately as follows :—

	INCHES.
January to May	8
June	8
July, August and September	30
October, November and December	8
Total ..	54

A detailed statement of the rainfall at Russellkonda and Surada during each month of the year from 1870 to 1929 is given in Appendix I.

26. *Forest rain-gauge stations.*—Forest rain-gauges are kept at the following localities :—Mojjagoda, Tarasingi, Kurcholi, Rogada and Ramnabadi. In Mr. Minchin's Working Plan, the rainfall of these stations from 1910 to 1918 is shown by means of ' column graphs ' with the remark that " While local cloud bursts do cause material difference in the years rainfall statistics of separate stations, yet one cannot help regarding these forest figures with suspicion." To quote only one example, in 1918 the Mojjagoda forest rain-gauge read a rainfall of 51 inches while the fall recorded by the Revenue rain-gauge at Russellkonda not more than 8 miles distant was only 29 inches and it produced severe famine conditions in the following year. Further comment is unnecessary. Since 1920 for some reason the tide has turned in the reverse direction. The average annual rainfall for the period 1920–1929 recorded by each one of the forest rain-gauges is well below that of Russellkonda or Surada. It is difficult to believe that precipitation in the forest tracts has decreased when compared with the places outside. The only conclusion to be drawn is that the forest readings are not reliable. No useful purpose will be served in comparing the rainfall of the different stations. However, the following statement furnishes the average annual rainfall for the ten-year period 1920 to 1929 calculated from the record of the forest rain-gauges. The figures of Russellkonda and Surada for the corresponding period are given for comparison. Detailed statement of rainfall from 1919 onwards appears in Appendix I.

Statement of average rainfall at the Forest Rain-gauge stations for the period 1920–29.

Name of station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
1. Russellkonda ..	0·94	0·54	1·25	1·56	3·33	7·55	9·12	10·25	10·80	5·10	2·08	0·01	52·54
2. Surada	0·97	1·06	0·68	1·77	4·26	12·66	11·41	11·30	12·23	8·18	2·34	0·08	66.94
1. Mojjagada ..	0·68	0·22	0·92	1·97	2·59	6·11	8·55	10·06	10·75	5·01	0·91	0·24	47·99
2. Tarasingi ..	0·97	0·56	0·87	1·57	2·15	7·55	8·28	9·51	13·24	3·44	1·60	0·29	50·02
3. Kurcholi	0·18	0·68	0·38	0·78	1·06	5·90	7·29	6·53	7·60	7·37	0·62	0·05	38·43
4. Rogoda	0·56	0·68	0·80	2·28	3·62	6·34	8·48	9·75	9·06	5·50	2·20	0·72	49·98
5. Ramanabadi ..	0·62	0·08	0·44	1·51	2·67	5·62	8·02	8·78	11·27	7·10	2·26	0·06	48·43

27. *Winds.*—* " The prevailing wind direction in the day varies from north-east to south-east. In the evenings the air is frequently quite still or a light westerly wind comes down from the hills on to the plains. Cyclones are a feature of the coast between July and November but Ghumsur is out of their effective range."

28. *Influence of climate on sal regeneration.*—The arrival of the south-west monsoon in June coincides remarkably with the ripening and fall of the sal seed. The first storms scatter the winged seeds to considerable distances. In certain years the early rains of May account for the fall of a good many partially ripened and unripened seeds. But they decay quickly in the ensuing hot weather. The timely break of the south-west monsoon plays an extremely important part in the natural regeneration of the sal forests. After having fallen to the ground, the seeds start germination almost at once, given an uninterrupted supply of moisture. In the absence of moisture, and consequent failure to strike root, the seeds perish rapidly within ten or fifteen days of their fall. Spells of rainless days during this early period of establishment are decidedly harmful to the successful regeneration of sal. If artificial means of of regeneration are to be resorted to, the factors indicated above have to be carefully considered.

29. *Health of the locality.*—Malaria is prevalent throughout Ghumsur and it is regarded as being of a virulent type. Dysentery and ring-worm are also common. Black water fever exists in the Agency but not in Ghumsur. The most unhealthy tracts are the Kukuluba, Bontha and Pondakhol ranges and Chokkâpad reserve of Mojjagoda range which have been declared as such by Government.

SECTION 5—WATER-SUPPLY.

30. *Water-supply.*—There are no perennial streams of importance. The Rushikulya and the Mahanadi are the two prominent rivers of Ghumsur. Even they dry up in the hot weather. Water may however be struck in places by digging pits in the river bed. Reservoirs have been constructed by the Public Works Department at Russellkonda and Surada for irrigation purposes. Forest rest-houses and subordinates' quarters are supplied with wells.

SECTION 6—DISTRIBUTION AND AREA.

31. *Distribution of the forest among ranges.*—The Ghumsur forests are distributed among seven ranges as follows :—

Range.	Head-quarters.	Number of reserves.	Area in acres.
1. Russellkonda ..	Russellkonda ..	9	51,860
2. Mojjagoda ..	Do. ..	5	103,632
3 Kukkuluba ..	Tarasingi ..	4	54,411
4. Bontha ..	Do. ..	4	42,657
5. Buguda ..	Buguda ..	9	37,494
6. Surada ..	Surada ..	9	54,431
7. Pondakhol ..	Gazilbadi ..	3	42,993
	Total ..	43	387,478

Pondakhol range and Chokkapad reserve of Mojjagoda range lie within the Agency. Kukuluba and Bontha ranges have been declared as unhealthy tracts by Government. The names of all reserves with their areas will appear in paragraph 37.

32. *Area.*—The total area of the reserved forests dealt with in this plan is 387,478 acres or approximately 600 square miles. The area of the reserves mentioned in the section 16 notifications is incorrect. Most of the reservation was done between 1887 and 1902. Subsequently the Government of India Survey Party surveyed the reserves in the season of 1903–1907 and prepared contour maps on the scale of 4 inches to 1 mile. The area of the reserves adopted in this working plan is taken from the Survey of India maps and for those reserves which have no such maps, the area is based on the sketches prepared at the time of notification.

33. *Need for the survey of Chokkapad reserve.*—Survey of India 4-inch maps are available for all reserves except Chokkapad, Sollundi, Nagiri, Chamunda and Budrungu and the minor extensions made to the main reserves. The area of Chokkapad reserve as notified under section 16 is 41,400 acres. Whether it represents the correct area is uncertain. The country is hilly throughout and no scheme of exploitation can be thought of, without the aid of 4-inch contour maps. The present plan does not propose any fellings in Chokkapad reserve. But during the next period, selection fellings may very likely be prescribed here. It is therefore of importance that steps be taken

to get the reserve surveyed and mapped by the Government of India Survey Party. The other reserves mentioned above are small and do not immediately need contour maps. Nevertheless, to complete the work, they too should be surveyed while the Survey of India are working in this locality.

SECTION 7.—STATE OF THE BOUNDARIES.

34. *Boundary lines.*—* " The boundaries generally are satisfactory so far as their alignment goes. Frontier lines between the reserves and adjoining zamindaris and between the reserves and the Ganjam agency are 60 feet wide. Elsewhere, reserve boundaries are 20 feet wide. The frontier lines and the Agency boundary are cleared once a year during fire protection ; beat subordinates are responsible that the other reserve lines are kept clear perpetually.

35. *Cairns.*—" Where stone is available the cairns are of rough stone packed in the shape of a cone. The cairns vary in height and size. In the open plains where stone is not available they are of earth, covered over with turf, and are surmounted by a white-washed post. Beat subordinates are supposed to renew the posts from time to time and keep the cairns in good order, free of cost.

36. *Revision of boundary notifications.*—" Revision of the wording of almost all reserve boundary notifications under section 16 is required. The present descriptions are based on an original somewhat inaccurate survey. Since their publication, the Survey of India have prepared maps on a 4 inches : 1 mile scale. The Survey of India maps do not agree exactly with the previous maps ; and the publications of new notifications, based on the Survey of India maps, is necessary." This work though prescribed in Mr. Minchin's Working Plan has not been carried out. On the borders of the Ghumsur forests there are many zamindaris and Feudatory States. They have generally recognized the present boundaries. Although no disputes have taken place within recent years it is essential to have the boundaries correctly described and notified, though notification and description are naturally not to be based on Survey of India maps.

SECTION 8.—LEGAL POSITION.

37. *Reserves notified under section* 16.—All the reserved forests dealt with in this plan have been settled and notified in the *Fort St. George Gazette* under section 16 of the Madras Forest Act V of 1882. The areas disreserved subsequently have also been notified under section 24. The earliest reservation dates from 1887. Almost all the important forests were reserved by 1902. Since then, there have been only five important reservations, Budrungu, Chamunda, Nagiri and Sollundi in 1913 and Chokkapad in 1917. A list of reserves and disreserved areas together with the notification number, date and their area is given below :—

Reserve.	Reservation under section 16. Notification in *Fort St. George Gazette.*	Area G.I. Survey 1904–1907.	Disreservation under section 24. Area.	Disreservation under section 24. Notification in *Fort St. George Gazette.*	Area of reserve on April 1930.
		RUSSELLKONDA RANGE.			
		ACS.	ACS.		ACS.
Malati ..	No. 253, dated 13th Sep. 1888. Effect, dated 1st Nov. 1888. Page 684, dated 18th Oct. 1888.	1,893·8	..	....	1,893·8
Visnuchakram. Kumarosuni..	No. 68, dated 16th Feb. 1891. Effect, dated 31st Mar. 1891. Page 121, dated 24th Feb. 1891.	2,734·7	23·2	No. 334, dated 24th June 1896. Effect, dated 15th July 1896. Page 828, dated 7th July 1896.	2,696·7
Kumarosuni..	....	..	38·0	No. 73, dated 14th April 1921. Effect, dated 15th May 1921. Page 435, dated 19th April 1921.	
Binodia ..	No. 68, dated 16th Feb. 1891. Effect, dated 31st Mar. 1891. Page 121, dated 24th Feb. 1891.	537·6	1·1	No. 334, dated 24th June 1896. Effect, date 15th July 1896. Page 828, dated 7th July 1896.	537·6
Tangarai ..	Do.	2,019·2	..	....	2,019·2

Reserve.	Reservation under section 16. Notification in *Fort St. George Gazette.*	Area G.I. Survey 1904–1907.	Disreservation under section 24. Area.	Disreservation under section 24. Notification in *Fort St. George Gazette.*	Area of reserve on April 1930.
	Russellkonda Range.—cont.				
		ACS.	ACS.		ACS.
Kullada ..	No. 379, dated 17th July 1893. Effect, dated 1st Nov. 1893. Page 844, dated 25th July 1893.	3,442·0	..	....	
Kullada Extension.	No. 200, dated 21st June 1920. Effect, dated 1st Aug. 1920. Page 850, dated 29th June 1920.	438·5	..	....	3,880·5
Sondasolia ..	No. 461, dated 10th Sep. 1896. Effect, dated 15th Dec. 1896. Page 1158, dated 15th Sep. 1896.	2,095·4	..	....	2,095·4
Kaliamba ..	No. 39, dated 11th Jan. 1897. Effect, dated 31st Mar. 1897. Page 108, dated 19th Jan. 1897.	8,040·3	6·0	No.150, dated 25th May 1923. Effect, dated 1st July 1923. Page 555, dated 29th May 1923.	
Kaliamba Extension.	No. 117, dated 15th Mar. 1900. Effect, dated 1st June 1900. Page 427, dated 20th Mar. 1900.	1,586·5	..	....	9,620.8
Baiballi ..	No. 193, dated 27th Apr. 1898. Effect, dated 30th June 1898. Page 359, dated 3rd May 1898.	18,634·9	..	....	1,8634·9
Tiliki ..	No. 338, dated 24th July 1899. Effect, dated 1st Oct. 1899. Page 925, dated 1st Aug. 1899.	10,557·4	84·0	No. 73, dated 14th Apr. 1921. Effect, dated 15th May 1921. Page 434, dated 19th Apr. 1921.	
Tiliki Extension—Gundribadi Enclosure.	No. 180, dated 31st May 1928. Effect, dated 15th July 1928. Page 908, dated 12th June 1928.	7·6	..	....	10,481·0
				Total ..	51,859·9
	Mojjagoda Range				
Dhimirijoli ..	No. 414, dated 16th December 1887. Effect, dated 1st Feb. 1888. Page 996, dated 20th Dec. 1887.	4,126·1	..	....	4,126·1
Rambha ..	No. 550, dated 4th Nov. 1893. Effect, dated 1st Mar. 1894. Page 1304, dated 7th Nov. 1893.	13,105·2	..	....	13,105·2
Dharpangia ..	No. 422, dated 14th Sep. 1893. Effect, dated 1st Mar. 1894. Page 1304, dated 7th Nov. 1893.	16,488·3	505·0	No. 296, dated 11th June 1901. Effect, dated 15th July 1901. Page 1089, dated 11th June 1901.	17,672·3
Dharpangia Extension I. II.	No. 14, dated 26th Dec. 1901. Effect, dated 1st Apr. 1902. Page 20, dated 7th June 1902.	969·6 214·4	..	....	
Galleri ..	No. 36, dated 24th Jan. 1899. Effect, dated 1st May 1899. Page 102, dated 24th Jan. 1899.	26,540·7	72·0	No. 73, dated 14th Apr. 1921. Effect, dated 15th May 1921. Page 434, dated 19th April 1921.	
Galleri Extension I—Block I .. Block II. Block III .. Block IV. ..	No. 200, dated 21st June 1920, Effect, dated 1st Aug. 1920. Page 849, dated 29th June 1920.	36·5 107·5 19·0	..	....	27,328·8
Galleri Extension II.	No. 240, dated 25th July 1927. Effect, dated 25th Sep. 1927. Page 1204, dated 25th July 1927.	678·5 18·6	..	....	
Chokkapad ..	No. 315, dated 12th June 1917. Effect, dated 1st Aug. 1917. Page 867, dated 17th July 1917.	*41,400·0	..	....	41,400·0
				Total ..	103,632.4

Reserve.	Reservation under section 16. Notification in *Fort St. George Gazette.*	Area G.I. survey 1904–07.	Disreservation under section 24. Area.	Disreservation under section 24. Notification in *Fort St. George Gazette.*	Area of reserve on April 1930.
	Kukuluba Range.				
		ACS.	ACS.		ACS.
Chandragiri ..	No. 306, dated 1st July 1891. Effect, dated 15th Oct. 1891. Page 690, dated 7th July 1891.	17,326·1	44·0	No. 73, dated 14th Apr. 1921. Effect, dated 15th May 1921. Page 435, dated 19th Apr. 1921.	17,484·3
Chandragiri Enclosure.	No. 323, dated 27th June 1901. Effect, dated 15th Sep. 1901. Page, 1243, dated 17th July 1901 : 81 acres.				
Pudrungi Enclosure.	No. 10, dated 15th Dec. 1911. Effect, dated 1st Mar. 1912. Page 9, dated 2nd Jan. 1912.	135·0	..	....	
Kutnikuppa A. 2.	No. 85, dated 8th Mar. 1922. Effect, dated 15th Apr. 1922. Page 292, dated 14th Mar. 1922.	67·2	..	....	
Chodiapalli ..	No. 330, dated 2nd July 1896. Effect, dated 1st Oct. 1896. Page 826, dated 7th July 1896.	810·9	..	....	810·9
Ambazora ..	No. 226, dated 19th May 1899. Effect, dated 30th June 1899. Page 611, dated 30th May 1899.	29,634·6	..	....	29,738·3
Ambazora Enclosure.	No. 56, dated 29th Jan. 1906. Effect, dated 1st May 1906. Page 138, dated 30th Jan. 1906 : 17 acres.				
Ambazora Extension I. Gopadaro Enclosure.	No. 110, dated 17th Mar. 1920. Effect, dated 15th May 1920. Page 445, dated 23rd Mar. 1920.	103·7	..	....	
Gundribadi ..	No. 269, dated 13th June 1899. Effect, dated 15th July 1899. Page 722, dated 20th June 1899.	6,377·6	..	....	6,377·6
				Total ..	54,411·1
	Bontha Range.				
Jaganadprasad	No. 319, dated 17th July 1890. Effect, dated 1st Oct. 1890. Page 509, dated 22nd July 1890.	16,688·7	..	....	16,688·7
Brahmansai	No. 192, dated 23rd Apr. 1898. Effect, dated 15th June 1898. Page 357, dated 3rd May 1898.	7,600·6	..	....	7,600·6
Paichalia ..	No. 409, dated 31st Aug. 1898. Effect, dated 1st Nov. 1898. Page 835, dated 6th Sep. 1898.	8,159·4	..	....	8,159·4
Gogodo ..	No. 191, dated 22nd Apr. 1899. Effect, dated 1st June 1899. Page 480, dated 2nd May 1899.	10,097·2	..	....	10,208·6
Gogodo Extension.	No. 316, dated 24th Aug. 1903. Effect, dated 15th Dec. 1903. Page 978, dated 1st Sep. 1903.	111·4	..	....	
				Total ..	42,657·3
	Buguda Range.				
Panchabuthi.	No. 53, dated 12th Feb. 1891. Effect, dated 31st Mar. 1891. Page 102, dated 17th Feb. 1891. *Revised boundary notification.* No. 265, dated 30th June 1904. Page 665, dated 5th July 1904.	4,622·0	..	....	4,622·0

Reserve.	Reservation under section 16. Notification in *Fort St. George Gazette*.	Area G.I. survey 1904–07.	Disreservation under section 24. Area.	Disreservation under section 24. Notification in *Fort St. George Gazette*.	Area of reserve on April 1930.
		BUGUDA RANGE—*cont.*			
		ACS.	ACS.		ACS.
Kuddapada ..	No. 419, dated 3rd Sep. 1897. Effect, dated 30th Nov. 1897. Page 1131, dated 7th Sep. 1897.	1,682·0	..	....	1,682·0
Kurcholi A.	No. 538, dated 8th November 1897. Effect, dated 31st Jan. 1898. Page 1425, dated 16th Nov. 1897.	5,514·0	..	....	5,514·0
Kurcholi B ..	Do.	876·0	..	....	876·0
Kriamba ..	No. 65, dated 4th Feb. 1902. Effect, dated 15th Apr. 1902. Page 155, dated 11th Feb. 1902.	21,533·0	..	....	} 21,539·0
Jadupada Enclosure.	No. 216, dated 12th Apr. 1917. Effect, dated 15th May 1917. Page 545, dated 1st May 1917.	6·0	..	....	
Budrungu ..	No. 217, dated 30th Apr. 1913. Effect, dated 1st July 1913 .. Page 957, dated 20th May 1913.	* 738·1	..	....	738·1
Chamunda ..	No. 242, dated 10th May 1913. Effect, dated 1st July 1913 .. Page 1009, dated 10th June 1913.	* 564·9	..	....	564·9
Nagiri ..	Do.	* 1,140·9	..	....	1,140·9
Sollundi ..	Do.	* 816·6	..	....	816·6
				Total ..	37,493·5
		SURADA RANGE.			
Bondagocha.	No. 254, dated 13th Sep. 1888. Effect, dated 1st Nov. 1888. Page 684, dated 18th Sep. 1888.	3,229·1	..	....	3,229·1
Vinjigiri ..	No. 318, dated 28th Jan. 1891. Effect, dated 15th Mar. 1891. Page, 72, dated 3rd Feb. 1891.	5,291·5	..	....	5,291·5
Dheppaguda	No. 406, dated 27th Aug. 1897. Effect, dated 30th Nov. 1897. Page 1099, dated 31st Aug. 1897.	2,044·8	..	....	2044·8
Hukuma ..	No. 540, dated 8th Nov. 1897. Effect, dated 31st Jan. 1898. Page 1428, dated 16th Nov. 1897.	4,313·6	..	....	4,313·6
Mundapitta ..	No. 83, dated 10th Feb. 1898. Effect, dated 30th Apr. 1898. Page 117, dated 15th Feb. 1898.	5,676·8	..	....	5,676·8
Pippalaponka Bhagvanpur Block.	No. 150, dated 24th Mar. 1898. Effect, dated 31st May 1898. Page 268, dated 29th Mar. 1898.	1,088·0	..	....	} 8,389·1
Nondapodaro Block.	Do.	7,291·5	..	....	
Nondapodaro Enclosure.	No. 19, dated 19th Jan. 1920. Effect, dated 15th Mar. 1920. Page 113, dated 13th Jan. 1920.	9·6	..	....	
Raipada ..	No. 350, dated 25th July 1898. Effect, dated 1st Nov. 1898. Page 733, dated 2nd Aug. 1898.	6,914·5	..	....	6,914·5
Rogoda ..	No. 342, dated 24th July 1899. Effect, dated 1st Oct. 1899. Page 928, dated 1st Aug. 1899.	16,015·1	..	....	16,015·1
Dumu Dumi Eastern Block.	No. 447, dated 10th Oct. 1900. Effect, dated 1st Feb. 1901. Page 1500, dated 16th Oct. 1900.	1,470·1	9·0	No. 91, dated 20th Feb. 1926. Effect, dated 15th Apr. 1926. Page 434, dated 2nd Mar. 1926.	} 2,556·8
Western Block.	Do.	1,095·7	..	....	
				Total ..	54,431·3

Reserve.	Reservation under section 16. Notification in *Fort St. George Gazette.*	Area G.I. survey 1904–07.	Disreservation under section 24. Area.	Disreservation under section 24. Notification in *Fort St. George Gazette.*	Area of reserve on April 1930.
		PONDAKHOL RANGE.			
		ACS.			ACS.
Dabuki ..	No. 445, dated 3rd Oct. 1890. Effect, dated 1st Jan. 1891. Page 781, dated 7th Oct. 1890.	1,250·6	..	....	1,250·6
Dhowgam ..	No. 424, dated 9th Sep. 1898. Effect, dated 15th Nov. 1898. Page 884, dated 20th Sep. 1898.	2,504·3	..	....	2,551·0 (Dhowgam and Dhowgam Enclosure)
Dhowgam Enclosure.	No. 319, dated 26th Oct. 1922. Effect, dated 1st Jan. 1923. Page 1142, dated 31st Oct. 1922.	46·7	..	....	
Pondakhol Adigudi Block.	No. 496, dated 3rd Nov. 1906. Effect, dated 1st Feb. 1907. Page 1144, dated 6th Nov. 1906.	38,535·8	..	....	39,191·8 (Pondakhol Adigudi Block and Ponkalogam Block)
Ponkalogam Block.	Do.	656·0	..	....	
				Total ..	42,993·4

* NOTE.—These reserves have not yet been surveyed by the Government of India Survey Party. The area is based on the sketches prepared at the time of the section 16 notification.

Abstract by ranges.

	ACS.		ACS.
Russellkonda	51,860	Surada	54,431
Mojjagoda	103,632	Pondakhol	42,993
Kukuluba	54,411		
Bontha	42,657	Total ..	387,478
Buguda	37,494		

38. *Settlement of enclosures in Pondakhol reserve.*—The village enclosures situated within the limits of Pondakhol reserve are not yet completely settled and their boundaries have not been notified at all. Section 16 notification enumerates merely the names of 18 villages and cultivation retained as enclosures inside the reserve. One of them, Bodima of 60·8 acres, is not traceable either on the map or in the reserve. Besides these villages there are four enclosures, Dodali, Gwalima, Pariguda, Dombapalli shown on the Survey of India map, which are all inhabited and regularly cultivated but they do not find place in the section 16 notification. Two other small village enclosures called Gedapalla and Baimalla have been recently discovered on the Daringabadi foot-path at the extreme north-west corner of the reserve. At the time of reserving the Pondakhol forest the policy laid down by Government was to settle the Kondh villages and grant them sufficient area for cultivation. The boundaries of the present village enclosures should be described with reference to the Survey of India map and notified. Attention is drawn to G.O. No. 3005, Revenue, dated 3rd November 1908, in which Mr. Macmichael, the Collector of Ganjam, suggested fresh notifications. But this subject has for some reason been overlooked.

SECTION 9.—RIGHTS AND CONCESSIONS.

39. *General rights.*—Right of way over roads, cart-tracks, and foot-paths, right to worship at the shrines inside the reserve, and right to the use of water of the jungle streams, wherever admitted are recorded in the reserve notifications. Private villages, and cultivation surrounded on all sides by reserved forest, have been declared as enclosures and demarcated by lines and cairns except the few instances pointed out in paragraph 38. Several cart-tracks and foot-paths have fallen into disuse or have changed their courses and consequently they do not tally with the descriptions found in the reserve notifications. There are no rights to forest produce except those admitted to the Kondhs of Chokkapad.

40. *Rights of Chokkapad Kondhs.*—The following rights to forest produce are allowed to the Kondhs residing in the several hamlets of Chokkapad reserve :—" (1) Removal of bamboos for domestic purposes free of charge and

free grazing except as regards goats which will be rigorously excluded from the reserve. (2) Free permits for third class unclassified timber for domestic purposes. (3) Removal of dead and fallen firewood for domestic purposes free of charge. (4) Removal of thatching grass, fruits, leaves, edible roots and honey free of charge. (5) Removal of a sufficient quantity of sal free of charge to provide the Kondhs with the ploughs they require. With regard to the last item, the Maliko of each village will submit an indent annually to the District Forest Officer for the required number of ploughs. On receipt of sanction, the Ranger will have a sufficient number of sal trees marked and the Kondhs will be allowed to fell them."

41. *Kondh concessions.*—The Kondhs of all villages in Ghumsur including Pondakhol Agency enjoy free concessions of dry firewood, sal trees for ploughs, building materials, grazing and minor forest produce. A definite form of concession chit was standardized in Chief Conservator's Proceedings No. 85, dated 27th February 1923, and it is being used since. The terms set forth therein are :—" In consideration that—

(1) The Kondhs of village maintain and keep in good order the demarcation lines of the reserves within the neighbourhood of their village.

(2) The Kondhs keep all the fire lines in completely clear of combustibles from 15th February to the commencement of the rains.

(3) The Kondhs patrol the reserves near their village and prevent, put out and report fire in the reserves near their village.

(4) The Kondhs supply labour at the ordinary coolie rates for forest work when called upon to do so by the Range Officers.

(5) The Kondhs assist the Forest Department at all times to protect the State forests and detect offences and perpetrators of offences.

The District Forest Officer on his part undertakes on behalf of Government to grant them

(1) Trees for ploughs.

(2) Third class and unclassified timber for the repair of their huts.

(3) Bamboo for the repair of their huts.

(4) Permission to collect from reserve the following minor forest produce.

(5) Permission to collect the fruits of the fruit trees in the poramboke and waste lands of their village.

(6) Permission to graze cattle free.

Provided that (1) except in the case of concessions (4) and (5) above the produce granted is not used for sale or barter ; (2) no timber is felled by the Kondhs unless previously marked for them by the Range Officer or by a Forester under the Ranger's orders ; (3) no material is extracted from or cattle grazed in the specially protected sal blocks ; (4) only bona fide Kondh inhabitants of the village of shall be entitled to the above concessions ; and (5) the District Forest Officer may without warning cancel any or all of above concessions at his discretion and impose such restrictions as appear desirable."

The origin of these concessions dates back to 1906. In that year Mr. S. Cox, the District Forest Officer of Ganjam wrote an interesting and informative report on the fire protection of the Ghumsur forests—vide B.P. No. 109, Forest, dated 3rd January 1907. He pointed out that " Conservancy during the last thirty years prior to 1906 has not added to the value of these forests one acre of sound timber. This is the result of thirty years of forest fires and until fires are stopped it is superfluous to discuss other measures of improvement." " Among the several suggestions made by Mr. Cox, the most outstanding one was to enlist the co-operation of the Kondh villages in protecting the forests by granting them special privileges. The Board of Revenue approved his proposal in its Proceedings, Mis. No. 315, Forest, dated 9th April 1906, but stipulated (1) that the privileges are liable to be withdrawn should there be any

failure to render the required assistance ; (2) that there should be no formal agreement which would in any way bind Government ; (3) that the arrangement decided on may be given effect to by an order in writing of the District Forest Officer. Since then the policy of granting concessions to Kondhs in order to secure their co-operation and good will, has been steadily pursued. The terms embodied in the present day concession chits are practically those that were outlined by Mr. Cox in 1906. The grant of produce is based on the actual requirements and grazing is as a rule limited to six head of cattle per house. Permission to collect dry fire wood does not find place in the concession form. This appears to be an omission which needs rectification.

In practice the Kondh does not wait for concession chits before he begins to avail himself of the free grants. He is always in and about the forest and he helps himself to whatever he needs. The concession chits legalize the removals already effected as a matter of course. At best it serves to infuse into the Kondh a sense of obligation to the Forest department. Among the conditions laid down in the forms, only those relating to fire protection are generally viewed with importance. The nature of the concessions is such that it is difficult or impossible to enforce the conditions strictly. Only general control can be exercised in order to safeguard the forests from abuse. During the past eleven years concessions were formally stopped only once in 1927–28 owing to the severe fire season of 1927. It resulted in some murmuring from certain Kondh villages but most of the Kondhs do not appear to have been affected by the punitive measure.

Statement 1 gives the concessions granted to Kondhs in 1919–20 to 1929–30 and statement 2 gives details of each range for the year 1929–30. The figures that appear under each class of produce or kind of cattle are approximate and the value is based on seigniorage rates. Nothing is shown under minor forest produce.

Statement 1.—Concessions granted to Kondhs from 1919–20 to 1929–30.

Year.	Number of ploughs.	Third-class timber.	Bamboos.	Fuel.	Cattle. Cow.	Buffalo.	Sheep.	Total value.
	NO.	C.L.DS.	H.L.DS.	H.L.DS.				RS.
1919–20	3348	1,946	5,504	137,611	3,436	681	62	9.432
1920–21	2689	1,640	4,017	93,774	3,041	541	150	7,082
1921–22	2532	1,252	4,048	81,750	2,862	506	..	6,330
1922–23	2335	1,212	3.273	50,535	2,054	315	..	5,188
1923–24	2706	1,276	3 816	47,720	2,876	359	..	4,733
1924–25	1825	1,201	3,101	43,564	3,270	398	..	4,862
1925–26	..	Record not available.						
1926–27	..	Do.						
1927–28	..	Concessions were not granted.						
1928–29	2642	1,374	4,731	26,540	3,181	511	..	5,610
1929–30	2673	1,889	4,483	24,420	3,818	576	267	6,265

Statement 2.—Concessions granted to Kondhs in each range during 1929–30.

Range.	Village.	Number of ploughs.	Third class timber.	Bamboos.	Fuel.	Cattle. Buffaloes.	Cows, bulls.	Sheep.	Value.
	NO.	NO.	C.L.DS.	H.L.DS.	H.L.DS.				RS.
Russelkonda ..	37	339	212	574	..	14	586	..	647
Mojjagada ..	72	820	471	1,683	..	243	823	78	1,687
Kukuluba ..	40	394	520	540	..	167	578	189	1,169
Bontha	44	394	225	697	13,160	58	326	..	988
Buguda	18	137	69	1,380	..	..	513	..	290
Surada	41	167	191	608	7,240	24	341	..	653
Pondakhol ..	43	422	201	402	4,020	70	651	..	831

42. *Bull grants to Pondakhol Kondhs.*—From 1909 to 1927, bulls were being given free to the Kondhs of Pondakhol with the object of inducing them to give up shifting (' podu ') cultivation. The authority for this grant is G.O. No. 3005, Revenue, dated 3rd November 1908. At the time of reserving the Pondakhol forests in 1906, the chief difficulties to be contended with were unrestricted firing, and ' podu ' cultivation of the hill slopes practised by the Kondhs. The demarcation lines cut by the Forest department had not become permanent and the Kondhs not understanding them were extending their cultivation over the lines. Mr. N. MacMichael, who was the Collector of Ganjam suggested that the Kondhs should be induced to forego their podu cultivation by providing

them with buffaloes to plough the lands in the plains and the valleys. A list of 29 villages was drawn out and their needs were calculated to be 112 pairs of buffaloes. It was estimated that an amount of Rs. 6,720 would be required to meet the cost of the buffaloes at Rs. 60 per pair. The proposal was approved by Government on the principle that the hill and the jungle tribes should be brought under the control of the Forest department by offering them employment and rewards. The experiment began successfully with a few selected villages in 1909. The only record relating to this grant available in the District Forest Office is a 'bull' register which shows the names of 36 villages and some scattered entries relating to the number of bulls given to each village since 1910. The reason for substituting bulls for buffaloes is not clear. Casualties were replaced free. The grant of bulls was regulated by the District Forest Officer and annually about ten pairs costing Rs. 200 to Rs. 300 were supplied. In the absence of any proper record, the total number of bulls thus awarded is not known. An amount of Rs. 5,429 had been spent till March 1927. Thereafter the grant was stopped on the assumption that the number of bulls sanctioned by Government had by then been granted. There is no need to revive the supply of bulls in the future. The Kondhs of Pondakhol have come to recognize the boundaries of the reserved forest and it is believed that they do not trespass into the reserve for practising 'podu' cultivation.

43. *Kondhs as tenants-at-will.*—In two enclosures Pudrungi and Gopadaro belonging to the Forest department, Kondhs have been permitted to settle down and cultivate lands rent free as tenants-at-will. Pudrungi is situated on the south-west of Chandragiri reserve and Gopadaro in the heart of Ambozara reserve. The Kondhs are required to protect the reserved forests from illicit fellings and fire and to render general assistance whenever required. A simple agreement has been entered into and is being renewed every year with the sanction of the Chief Conservator of Forests. In Pudrungi enclosure four families settled down first in 1921. They used to take great interest in fire protecting the Chandragiri coupes. By 1927, the families were reduced to one and the last Kondh to disappear fell a victim to a tiger while he was engaged in fencing his cultivation. Since then the enclosure has been deserted. In Gopadaro enclosure four Kondh families have continued their settlement since 1920.

44. *General results of the concessions.*—The concessions on the whole appear to work satisfactorily and their abuse is uncommon. The Kondhs are generally well disposed towards the forest administration. They provide labour for all sorts of forest work, when called upon to do so. In return for the concessions they undertake the fire protection and the general protection of the forests near their villages. They consider that the Forest Officer is responsible for their welfare and work well if properly treated. They are a great asset to the Forest department. The maintenance of good relations with the Kondhs who live in or adjoining the reserves is an important matter in the protection of the Ghumsur forests. Without their co-operation we cannot hope to protect from fire the ever-increasing areas coming under regeneration.

CHAPTER II.—THE FOREST.

SECTION 1.—COMPOSITION AND CONDITION OF CROP.

45. *Main types of forest.*—The forests of Ghumsur are not defined by distinct zones of vegetation based upon differences in elevation. Sal is the principal tree and it is the only tree for which there is any very effective demand. The types of forest described below are practically those adopted by Mr. Minchin. An alteration is made in the names, "Sal bearing hill forest" and "Lower hill forest" these will in future be referred to as "Ravine sal forests" and "Minor hill forest." The following different types are met with :—

(1) Plains sal forest, pure or nearly pure of 51,841 acres or 13 per cent, divided into first, second and third-quality classes.

(2) Ravine sal forest, nearly pure or mixed of 6,425 acres or 2 per cent, consisting of first and second quality sal irregularly mixed with other species and occurring in the valleys or the lower margins of the hills.

(3) Mixed hill forest of 159,194 acres or 41 per cent of scattered sal and other less valuable species situated in the main hills.

(4) Minor hill forest of 51,170 acres or 13 per cent, composed of inferior mixed deciduous growth and bamboos.

(5) Scrub jungle of 8,150 acres or 2 per cent situated on isolated outlying hills.

(6) Plains broken ground of 110,698 acres or 29 per cent, consisting of open, stunted and degraded tree growth.

46. *Tabular statement of composition.*—The distribution of the main types in the several reserves is shown below in a tabular statement. The area figures given in Mr. Minchin's plan are corrected with reference to the results of recent re-stockmapping.

Statement showing composition of the forests.

	Composition in acres.								
	Plains sal forest.								
	First quality.	Second quality.	Third quality.	Ravine sal forest.	Mixed hill forest.	Minor hill forest.	Scrub jungle.	Plains broken ground.	Total area.
RUSSELKONDA RANGE.									
Malati	..	..	334	..	..	1,510	..	50	1,894
Kaliamba	..	..	2,674	213	..	2,757	..	3,977	9,621
Tiliki	..	351	2,773	..	..	3,695	..	3,662	10,481
Baiballi	..	410	1,660	167	12,578	..	..	3,820	18,635
Kullada	..	..	1,223	..	..	2,597	..	60	3,880
Kumarasuni	..	..	..	..	..	..	2,697	..	2,697
Binodia	..	..	..	..	..	..	538	..	538
Tangarai	..	..	..	..	..	..	2,019	..	2,019
Sondasolia	..	..	..	..	..	..	2,095	..	2,095
Total	..	761	8,664	380	12,578	10,559	7,349	11,569	51,860
MOJJAGODA RANGE.									
Galleri	10	1,669	6,131	..	..	10,800	..	8,719	27,329
Rambha	..	146	94	1,233	10,923	..	..	709	13,105
Dharpangia	..	658	1,284	920	14,298	..	..	512	17,672
Dhimirijoli	..	260	725	103	2,604	..	..	434	4,126
Chokkapad	..	..	..	348	39,418	..	..	1,634	41,400
Total	10	2,733	8,234	2,604	67,243	10,800	..	12,008	103,632
KUKULUBA RANGE.									
Chandragiri	170	2,256	2,128	393	8,804	..	..	3,733	17,484
Chodiapalli	..	..	282	..	..	211	..	318	811
Ambazora	..	355	1,435	837	2,803	..	..	24,308	29,738
Gundribadi	..	139	1,393	98	2,363	..	..	2,385	6,378
Total	170	2,750	5,238	1,328	13,970	211	..	30,744	54,411
BONTHA RANGE.									
Jaganadprasad	..	..	2,560	..	..	6,512	..	7,617	16,689
Brahmansai	71	1,155	917	158	3,065	..	..	2,235	7,601
Paichalia	..	85	112	..	5,969	..	..	1,993	8,159
Gogodo	2	599	335	..	1,097	..	..	8,175	10,208
Total	73	1,839	3,924	158	10,131	6,512	..	20,020	42,657
BUGUDA RANGE.									
Kriamba	22	585	3,995	874	8,293	..	..	7,770	21,539
Kurcholi A	..	..	474	..	..	4,139	..	901	5,514
Kurcholi B	..	76	500	..	..	..	..	300	876
Panchabhuti	..	..	1,358	..	..	..	..	3,264	4,622
Sollundi	..	..	689	..	..	..	..	128	817
Nagari	..	..	474	..	..	..	285	382	1,141
Kuddapada	..	..	383	..	..	..	330	969	1,682
Chamunda	..	..	134	..	..	..	186	245	565
Budrungu	..	..	334	..	..	..	..	404	738
Total	22	661	8,341	874	8,293	4,139	801	14,363	37,494
SURADA RANGE.									
Rogoda	..	346	2,059	51	7,964	..	..	5,595	16,015
Vinjigiri	..	40	577	..	..	3,000	..	1,674	5,291
Dumu Dumi	..	..	851	..	..	..	..	1,706	2,557
Raipada	..	..	625	..	..	5,564	..	726	6,915
Hukuma	..	10	485	..	..	3,621	..	197	4,313
Bondagocha	..	42	212	6	2,909	..	..	60	3,229
Pippalaponka	..	1,055	996	105	2,820	..	..	3,413	8,389
Mundapitta	4	226	353	..	..	4,472	..	622	5,677
Dheppaguda	..	2	54	..	..	1,154	..	835	2,045
Total	4	1,721	6,212	162	13,693	17,811	..	14,828	54,431
PONDAKHOL RANGE.									
Dhowgam	..	169	169	10	..	1,138	..	1,065	2,551
Dabuki	..	37	..	3	..	..	..	1,210	1,250
Pondakhol	..	105	4	906	33,286	..	..	4,891	39,192
Total	..	311	173	919	33,286	1,138	..	7,166	42,993
Grand total	279	10,776	40,786	6,425	159,194	51,170	8,150	110,698	387,478

A.—Plains Sal Forest.

47. *Occurrence.*—*" Plains sal forest occurs as ' islands ' and belts among the forest at the base of the hills in almost all the reserves. Distribution may be seen in the 4″ to the mile maps and in the tabular statement of composition. Sal is the important tree of the locality and it is the only species whose life history has been studied in any degree of detail. The following account refers to sal in Ghumsur and confines itself to aspects most to be considered in prescribing silvicultural treatment and in calculating the rate of growth under a suitable form of treatment. Sal tends to grow as pure forest on ground that suits it, dominating and almost extinguishing other tree species. It is with relatively pure woods of sal that we are concerned principally.

48. *Growth of the sal tree.*—" It is in Ghumsur a deciduous tree. In localities with a heavy rainfall, on the other hand, it is practically evergreen. This peculiarity of Ghumsur sal affects the clarity of the " annual rings " and is therefore emphasized. The leaves fall in February. It is bare during a short period, perhaps not more than ten days. The new year's flush of leaves appears during February. Some trees retain their old leaves longer than others; and some produce their new flush before their neighbours have shed the old leaves. Nevertheless in the case of Ghumsur sal each individual tree is to all intents and purposes leafless for a distinct period. There is therefore a pause in the process of forming wood, during the few weeks before the leaves actually drop and onwards until the new flush is well started. This pause is recorded in the wood by an annual ring. The ring is sometimes obscure and sometimes recognizable. Trees that have grown under favourable conditions show rings.

" The new flush of leaves, appearing when other deciduous species are bare, enables patches of sal to be distinguished at a long distance. The almost perpetual canopy keeps grass and undergrowth in hand; and fire protection along rights-of-way, etc., is comparatively light work. For the same reason, water-supply within the sal forest is seldom insufficient.

49. *Flowering and seedling.*—" The tree flowers in March and the seed ripens and falls in the middle of June. The fall coincides with the advent of the monsoon. The seed is winged but heavy. It travels for distances up to about 70 yards, according to the strength of the wind. Sometimes it has germinated and has begun to sprout before falling from the parent tree. Failing this and given favourable showers it germinates at once on the ground. It does not ' keep ' at all. In Ghumsur seasons are regular and the requisite showers arrive generally in time.

50. *Development of seedlings.*—"Assuming that the seed has fallen on ' sal ground ' the development of the seedlings depends on certain circumstances. Seed falling upon an accumulation of undecayed leaves does not survive. The radicle fails to reach the soil and withers and dies. Seedlings starting life on open ground exposed to full sun light develop leaves healthier than those of plants situated in shade or half shade. In the shade perhaps there is less opposition in the shape of bind weeds and other plants; but sal grown in the open has greater vitality. Its root system is practically limited to a tap root which descends two feet into the soil in its first year. So as to be prepared for emergencies the young plant keeps ready at the column a number of buds in various stages of development. Sometimes these develop into a clump of shoots having something of the appearance of coppice.

" Our experience of sal sown naturally or artificially in the open is that a large proportion of the seedlings survive the rains, cold season and hot weather of their first year. At the age of 12 months they are healthy and promising and are commencing definitely to grow upwards. This is o, not merely on specially favourable situations, but also upon hard stony ground on which vegetation might hardly be expected to grow at all. Under shade matters are different entirely: it takes a great deal of ill-treatment to kill sal regeneration; but it is the usual thing for it to die back in the rains, to send up a shoot of 6 inches long, and to die back again an indefinite number of times. (During the process it forms a thick deep tap root.) When ultimately a gap appears in the crown

canopy above, the additional light enables the shoot to grow to a stage higher and to attain what may be called the 'switch' stage. If the break in the canopy closes again, the plant remains in the switch stage, with one or more shoots two or three feet long, waiting for more light to become available.

51. *Factors favourable to sal regeneration.*—" Sal regeneration in Ghumsur enjoys great advantages. The rains are regular, seed is borne almost every year, frost is not experienced, and soil sourness, arising from imperfect decay of fallen leaves and from lack of air-currents, is unknown. Whiteants appear to be responsible for the disappearance of the dead leaves. Sal regeneration, suppressed generally, is abundant throughout fire-protected sal forests.

52. *Progress of switch regeneration.*—" Whether sal regeneration remains indefinitely in the switch stage, or whether it becomes a tree with its crown in the 'upper storey' of the forest depends upon its situation at a time when a considerable break occurs in the canopy, by the death or removal of a dominant tree. When a large gap is created, a group of sa shoots arises from the suppressed regeneration, and the more vigorous specimens soon fill the gap and themselves suppress slower-grown competitors. These latter have the appearance of a 'connecting link' between the undergrowth and upper storey. Their rate of growth and chances of survival depend upon the amount of light to which they have access.

" Generally their growth in girth and height comes gradually to a standstill, they become crooked, stagnant and bark-bound. They attempt to make up for their lack of proper leaf surface by developing epicormic branchlets. Having arrived at this melancholy stage, and another gap having occurred overhead, the suppressed specimens take time to recover themselves. Before they can 'get going' a younger and more lively competitor arises, passes them, and fills the gap in the canopy.

53. *Natural, untended sal forest.*—" Natural, untended sal forest tends to become 'even-aged' (within the silvicultural interpretation of that expression). The comparatively healthy parts of the crop become divisible into an upper and a lower storey. The connecting link between the two is negligible, being for the most part unhealthy and stagnant. The difference in age between the healthy, mature, tree and the pole which is just attaining the height of the main crop is, in the case of the typical Ghumsur plains sal, only 23 to 25 years ; and the upper storey can thus be said to be 'even-aged' so far as the healthy portion of it is concerned.

" There are also in the upper storey overmature trees. Some have merely the commencements of unsoundness at the base of the trunk, others are moribund and completely unsound, and others are both unsound and also dead. There are in addition trees in which unsoundness has set in before the ordinary size of maturity has been reached. This may perhaps be on account of lack of elbow room for the crowns, or the trees may be the few representatives of the 'connecting link' that have struggled precariously into the upper storey.

54. *Sal, a light demander.*—" Sal in Ghumsur is a light demander from start to finish. (Its regeneration has however the power of remaining stationary, and at the same time fairly healthy in the shade.) When we attempt to grow sal under the selection system it is clear that, however intensively it may be tended, it is at a disadvantage and that the rate of growth of a selection forest must differ from that of tended even-aged sal crops.

55. *Past statistics of growth misleading.*—" Statistics of rate of growth of sal crops of uneven age, obtained by periodical measurements of observation plots have given in the past a misleading impression of the rate of growth of healthy trees in the lower girth classes.

" In dealing with such figures it has been the practice to calculate the average rate of growth of 'average specimens' i.e., to discard figures of increment of trees that have scarcely grown at all, rightly regarding them as unrepresentative ; but discarding also, as exceptional, what appeared to be outrageously large increments by a few stems. In eliminating these latter figures the very figures that indicate the rate of growth of properly tended sal in the sapling

"The treatment prescribed in the first plans for the plains high forest was protection and improvement fellings. For proper development, we believe now that sal from its earliest youth must have not only clear over head light but a certain amount of lateral light. Improvement felling was translated in practice into the removal of dead and dying sal trees. This was insufficient to secure development of the young crop of sal. Where light was afforded by the removal of large trees, and along the edges of woods the young sal advanced rapidly and is now a fairly good sapling crop. Elsewhere it suffered from suppression and merely "existed." The suppressed sal regeneration stayed in the "switch" stage or managed to attain a height of 6 to 10 feet. This larger suppressed regeneration is "straggly" and crooked and has become atrophied, so much so that it does not revive, if given access to the light. On its bark the threads of the "sal thicket fungus" are generally to be found. We have nevertheless an immense quantity of sal regeneration." The regeneration was enumerated by Mr. Minchin on 14 plots, selected at random in second quality areas. Sal regeneration was found to be present at the rate of 12,000 to 49,000 per acre.

63. *Choice between seedlings and 'established regeneration'*.— "We must first decide with what type of regeneration (as the basis of the growing stock of the future) we are going to be content. Sal regeneration is either from seedlings or from coppice and we must consider the merits of the two types. (There is no root sucker regeneration.) It is safe to assert that owing to the conditions under which they have existed, our present sal forests have arisen from coppice. This is the case not only in our sal forests but I believe in sal forests generally. The trees have originated from root systems of regeneration which had gone through the process of 'dying back' owing to fires or to other unfavourable conditions. The present tree growth is in this sense 'coppice'. There was once a theory which has been mentioned already that the young sal positively had to die back year after year, until its long tap root reached the permanent spring level. Mr. Hole's experiments and our own have, however, shown that under suitable conditions of soil and light there is no necessity for young sal to 'die back' at all.

"We have thus to decide on the respective merits firstly of the ideal seedling regeneration which has never 'died back' and which has been grown under favourable conditions from the moment of germination of the seed and onwards, and secondly of regrowth from the 'distressed' type of advance-growth that has been in the ground for many years. The former ought surely to be the best. We have however experience of the production of forest from the latter type. We know that with certainty and with very little trouble it will give us a complete new crop, and that a profitable type of forest will arise. Of the rate of growth and of the cost of production of the former, we know extremely little. At the present stage of our knowledge therefore it seems expedient to be content with the 'pseudo-coppice' reproduction."

What Mr. Minchin wrote in 1918 has proved to be sound. Experience in crop production during the last 10 years has proved fairly conclusively that "established regeneration" in the switch stage can alone give rise to a new crop and this type of regeneration must be present in sufficient quantities before an attempt is made to clear-fell the natural forest. Seedling regeneration is weak, slow-growing and therefore unable to compete with grass, weeds and inferior timber species that generally overrun the ground after a clearing is made. The 'switch' regeneration on the other hand, when cut back, exhibits great vitality and shoots up vigorously about five feet in the first year. Fortunately, everywhere in the plains sal first and second quality forests 'switch' regeneration is abundant, and a complete crop can be obtained the moment the overwood is removed.

64. *Even-aged crops dating from* 1920.—Since the introduction of Mr. Minchin's plan, regular even-aged crops have been established from 1920 to the present day. The system adopted was clear-felling, burning the debris and cutting back the sal advance growth. Of a total area of 11,055 acres of first and second quality sal, 2,003 acres have been converted into even-aged high

forest 1 to 10 years' old. Excepting the latter crops of the last three or four years, all the others show signs of faulty treatment. Softwoods and climbers have done considerable damage to the sal in its early life and arrested its normal development. In some places bamboos have invaded the ground. Coppice stems or 'wolves' are also found in large numbers. Wherever thinnings were executed unduly early, many sal stems have bent down owing to the loss of the support afforded by their neighbours and these will probably not recover. All these factors have contributed to the irregularity that is noticeable in the earlier crops. Such faults can be avoided in future by the application of intensive cleanings in the early life and by timely thinnings.

(ii) Third quality sal forest.

65. *Description of the natural forest.*—*" This is a mixed quality. It owes its inferiority to shallow soil primarily, and besides this to propinquity to villages, ill-treatment, pollarding, fires and grazing. Generally speaking these unpropitious conditions occur at a distance from the main hills. In the third quality areas, sal is easily the principal species ; but the crop is not as pure as in the first and second quality forests.

" The characteristics of this class are short, irregular-shaped boles, and the presence of grass. One feels that a course of simple coppice treatment is what it requires. No very detailed description or analysis of the crop is necessary. It contains in the average type of crop hardly a perfect or even a healthy stem of the higher classes ; and there is only one thing to do, cut it down. Of this operation and of its results we have considerable experience."

66. *Re-stockmapping of the third quality sal in the natural forest and coppice coupes.*—During the currency of the old working plan, errors were noticed in the stock-maps of the third quality sal forests. Considerable areas of broken ground and non-sal forest had been included in the compartments representing the third quality sal. Certain compartments did not contain any sal, while extensive sal bearing areas outside the compartments had been omitted. The fact that this stock-mapping had been done only roughly is referred to in Mr. Minchin's Plan. In the lay out of the coupes for fellings, non-sal areas were sometimes included in large proportions and in consequence such coupes fetched comparatively low prices and the resulting coppice crops are for the most part poor and unfit to tend. For purposes of the revised plan, 31 reserves have been re-stockmapped in detail. Patches of good third quality forest down to a minimum size of one acre in extent but not less have also been mapped. Similarly all the worked coppice coupes have been examined and the sal contents differentiated and shown on the maps. It is believed that the revised maps will afford reliable guidance for the lay-out of coupes in the future. The only reserves excluded from re-mapping are—Rambha, Dharpangia, Chokkapad, Ambazora, Gundribadi, Paichalia, Gogodo and Pondakhol. These are situated in remote localities where there is no prospect of opening any coupes at present. They may, if necessary, be taken up for stock-mapping at the next revision.

67. *Coppice crops dating from* 1903–04.—The earliest coppice coupes date from 1903–04 and are now 26 years' old. Up to 1915–16 the coupes were intended to be 'coppice with standards.' In such areas the standards may be seen suppressing a number of sal poles around them. Since 1916–17 the coupes have been simple coppice. At the time of felling the older coppice coupes, sal regeneration was practically non-existent owing to fires and grazing. They therefore contain a considerable admixture of species other than sal. Nevertheless sal regeneration may now be seen to be establishing itself naturally under neath the present crop. Of a total area of 40,786 acres of third quality sal, 10,472 acres have been converted into even-aged coppice crops. In many coupes sal is mixed up with large areas of broken ground and non-sal species which are now shown separately in the revised maps. Up to 1919, none of the crops received any tending and from 1920 the prescribed thinnings were either neglected or executed at irregular intervals. Sal has thereby grown under severe handicaps and has suffered badly from early suppression and from climbers. Even to-day there are crops 10 years and above in age that have received no attention whatever.

68. *Degree of unsoundness in the oldest coppice crops.*—In view of the possibility of raising the rotation of the coppice crops from 25 to 40 years, it was thought desirable to test the unsoundness of the oldest crops of Kullada Gundribadi and Kontaipalli series when they were some 25 years of age. In April 1929, a sample strip 11 feet wide was cut in each coupe and every sal tree was felled close to the ground and the stumps examined. The undergrowth was excluded. Kullada Coupe I gave 17 per cent unsoundness, Gundribadi Coupe I, 14 per cent and Kontaipalli Coupe I, 26 per cent. The unsoundness originated mainly from two sources. First, a type of heart rot that rendered the heartwood white and powdery, and second, unhealthy occlusion around the decaying stool accompanied by termite attack. The proportion of unsound stems on the average is 19 per cent and is not sufficiently high to be regarded as a serious factor in the future management.

B. Ravine Sal Forest.

69. *Description of the natural forest.*—The ravine sal forest is closely associated with rich accumulations of well drained alluvial soil in the deep valleys or in the pockets of the hill sides. The ground is generally interspersed with rock and there are great variations in the depth of the surface soil. The forest resembles the plains sal forest of qualities I and II, but it is more irregular and contains a large admixture of miscellaneous species and bamboo. The ravine forests are subject to severe fires that sweep frequently over the hills. Scattered trees have managed to attain magnificent proportions, but the majority of them are unsound and have grown under extremely unfavourable conditions. The boles of the mature trees are generally crooked and their crowns ill-shaped. The tree trunks at the base have been corroded by fire and rot working more or less alternately with the result that the heartwood is exposed up to a height of 4 or 5 feet from the ground. Fires continue to be the greatest menace in this type of forest.

70. *Quality classes.*—There are great variations in quality but generally first and second quality sal predominate and are mixed together intimately. The intention has been to include within the ravine forest, qualities corresponding to the I and II quality sal forest of the plains. No attempt is made to subdivide the areas according to quality. * " The fastest grown sal seems to be the best quality of ravine sal. Its rate of growth is faster than the first quality of the plains and the rapid increment continues longer. In a few typical stems that have been examined, the falling off in girth increment became appreciable at about 7′ 6″ in girth, about the year 70. Up to that time the annual girth increment was well over 1″. This quality is only a small proportion of the area. The average quality appears to correspond in rate of growth to the plains II quality, that is to say, 4′ girth in 55 years and 5′ girth in about 80 years. It can however be trusted to remain sound to between 4′ 6″ and 5′, whereas the II quality of the plains is liable to unsoundness at 4′ 3″ in girth at an age of 60 ".

71. *Maturity of species other than sal.*—* " In the case of other species no exact statements can be made . *Pterocarpus marsupium* of ordinary quality is mature apparently at 4′ 6″ ; it is found sound up to 6′ in girth, but this is rather unusual.

" *Adina cordifolia* is found sound up to 7′ in girth, but this is usually mature at about 5′ 6″.

" *Anogeissus latifolia* is seldom to be seen sound above 5′ in girth. Most of the remaining timber species seem to be mature at 4′ to 5′ in girth. But *Mangifera indica, Bassia latifolia, Bombax malabaricum* and of course *Ficus* species run to large sizes."

72. *Regeneration.*—* " Generally speaking regeneration of sal is present ; but in small quantities by comparison with the regeneration of the plains sal forest. The habits of the sal regeneration in the hill areas are, so far as is known, similar to those of the plains sal. In perhaps 60 per cent of the whole hill sal area there is sufficient sal advance growth to enable clear-felled coupes to be

regenerated by cutting back young advance growth of sal. In 40 per cent of the hill area (insufficiently stocked with sal advance growth), natural regeneration of useful timber species other than sal is present in very small quantities, together with a sprinkling of sal regeneration. The young plants are present only in numbers sufficient to perpetuate the present type of irregular mixed forest. With careful management natural regeneration may improve." Mr. Minchin recommended artificial regeneration with suitable species to ensure a complete crop within a short period, say, one to five years.

In 1920 and 1921, artificial regeneration of various species was attempted, but it had to be given up on account of its prohibitive cost. Even in the areas that were regenerated artificially, it became evident later that there was some amount of sal advance growth that could have been relied upon to give a crop of fairly good stocking. In many ravine compartments there is no doubt whatever that sal regeneration is scanty. The distribution is not uniform and there is a tendency for the regeneration to collect together in irregular patches. Forest fires do cause the destruction of considerable quantities of young regeneration, but it is not certain whether there are other causes which contribute to the paucity of regeneration on apparently suitable soils. Before attempting to discover those causes, it will be necessary to keep out fires from the ravine areas and watch the results. There is some evidence to believe that the slope of the ground and the surface run-off of the rain water account partly for the patchy character of the sal regeneration. Fresh seeds blown down from the sal trees at the break of the monsoon germinate almost at once, but they take some time to get firmly rooted into the soil. The slope of the hill sides, the fierce winds that prevail in the valleys, the rapid surface-wash of the rain water are all disturbing factors which upset the position and proper development of the germinating seedlings. In experimenting with broadcast sowing it has been observed by the writer that seeds distributed more or less uniformly over a gentle hill slope are washed down the path of water currents until they meet some obstruction and then the seeds are heaped up above a mass of debris. The successful ones germinate and form a patch of seedlings. Under natural conditions the phenomenon now described is likely to get accentuated with the steepness of the hill slope. The configuration of the ground also appears to be responsible for the indifferent character of the sal regeneration. On hill sides the nature and depth of the soil vary at short distances, being anything from rich alluvial deposits to an outcrop of bare rock. Wherever hard stony subsoils come up to the surface, sal regeneration is conspicuously absent. Detailed analysis of sal regeneration has been made by the writer in 1928 on a 2-acre plot near Rambha that appeared to be deficient in sal advance growth. Enumerations showed the presence of sal regeneration to the extent of 2,600 per acre. But they were by no means uniformly distributed and only 852 plants had really established and grown up to the switch stage. The remainder were no more than seedlings in various stages of development and would serve no useful purpose in the establishment of a normal crop by the clear-felling method.

73. *Re-mapping of the ravine sal forest.*—The ravine compartments stock-mapped for Mr. Minchin's Working Plan were found to contain large areas of unsuitable non-sal forest. The clear-felling of such areas has produced disappointing crops, a large proportion of which is merely softwood forest. For the revised plan, all the unworked compartments of the ravine forest have been examined carefully and re-mapped with a view to excluding all those areas that do not contain sal. In fact the intention is to admit only the true sal bearing forest which shows qualities comparable to the I and II quality plains sal. In stock-mapping such compartments, areas in which bamboo occupies over 50 per cent of the canopy have been excluded. Further, some areas by virtue of their situation as well as their composition have been transferred to the plains sal forest of II or III quality. It is believed that the revised maps will afford a reliable guide to the lay-out of the future coupes and solve partly the problem of regeneration in this type of forest.

74. *Even-aged crops dating from* 1921.—From 1921, high forest sal crops have been established on the lines adopted for the plains sal I and II quality; that is, clear felling, burning the debris and cutting back the sal advance growth.

Since no coupes were felled during 1922–23 and 1923–24, there is a break in the continuity of the age classes. The fires of 1923 and 1925 burnt nearly the whole of the 1921 crop and a large part of the 1922 crop. The burnt areas had to be cut back and consequently the subsequent crops have grown up irregularly. In almost all coupes, softwoods and climbers are predominant and large areas have been invaded by bamboo. The selection of unsuitable ground for regeneration is partly responsible for this state of affairs. At present the practice is to exclude such areas from tending. In the sal-bearing areas, sal is mingled with a large proportion of softwoods and has suffered from suppression in the early years. In several instances climbers have distorted the leading shoots of sal. On the whole the crops look miserable in most places when compared with the plains first and second quality sal. With more intensive tending it should be possible to improve the proportion as well as the quality of the sal in the growing stock.

75. *Teak and Gmelina plantations.*—Under the scheme of artificial regeneration prescribed in Mr. Minchin's Working Plan, about 20 acres of Ravine Coupe I were planted with teak, *Gmelina arborea, Pterocarpus marsupium, santalinus* and *Cedrela Toona* in June–July 1920. The only species that have established themselves successfully are teak and Gmelina. In May 1923 a disastrous fire burnt the planted area. Gmelina escaped damage but the teak had to be cut back in February 1924. Both the species are growing well in spite of the adverse conditions through which they have passed. A few stems of Gmelina measured at an age of 9 years showed an average girth of 17 inches and a height of 43 feet. The teak is now about 6 years' old and the Gmelina about 10 years. In Coupe II, an area of 10 acres was planted in 1921 with teak, *Pterocarpus marsupium, Cedrela toona and Eugenia jambolana.* The only species that has survived is teak. It is confined to a small area of one acre. In spite of the late planting and improper tending, individual stems have grown extremely well. At an age of 9 years, measurements showed the girth varying from 12 to 17 inches and height from 37 to 45 feet. From the two experimental plantations we have learnt that teak and Gmelina could be successfully introduced in the ravine areas. Both species show a good rate of growth for their age.

C. Mixed Hill Forest.

76. *General description of the forest.*—*" The composition and density, etc., of the forest could be ascertained exactly only by the execution of very extensive enumeration, and this has not been done. Enumeration would be very costly, whilst the quantity of timber that we may expect to extract is small in proportion to the area. After excluding from the hill forest the better class areas—6,425 acres called ' ravine sal forest ',—there remain 159,194 acres of less promising forest situated on moderately steep slopes for the most part. The ground consists of patches of fairly good soil, usually only 8 or 9 inches in depth, interspersed amongst sheet-rock, boulders and gravelly soil. Below the soil, where it exists, there is a layer of sub-soil, gneissic rock in varying stages of decomposition. As the rainfall of the locality is comparatively heavy, and since the soil and subsoil produced from the gneissic rock are decidedly fertile, the tree growth is many degrees better than ' scrub jungle,' and the ground is fairly well covered. The poorer areas (generally the steeper slopes) bear numerous *Cleistanthus collinus* 35 feet in height and *Anogeissus latifolia*, also bamboo (*Dendrocalamus strictus*) and stunted specimens of *Odina, Garuga, Sterculia, Grewia, Bursera, Phyllanthus emblica, Terminalia tomentosa, Diospyros melanoxylon, Ixora parviflora, Gardenia, Buchanania, Adina cordifolia* and *Pterocarpus marsupium.* Here and there occur patches of *sal.* In the neighbourhood of water courses there are always well-grown *Mangifera indica* and *Bassia latifolia* and in such localities (and wherever the soil improves) will be found occasional good specimens of *Anogeissus*, sal, *Pterocarpus marsupium, Adina*, etc. Throughout the forests regeneration of the good species is to be found if closely looked for, but it is scanty, usually twisty and stunted in appearance. The useful specimens of full-grown trees are generally crooked and have but a short length of bole : this is due to the comparatively open character of the forest.

"The slopes are seldom so precipitous as to prevent extraction of timber by dragging with buffaloes and by carting."

77. *Exploitation for the sawmill and its effect.*—The mixed hill forests were subjected to very heavy exploitation for a period of seven years from 1920–21 to 1927–28, with the sole object of running the Russellkonda Saw Mill. Extraction of timber commenced from 1920–21 and up to 1924–25 it would appear that trees of 4′-6″ in girth and above were felled. Subsequently every sal tree down to 3′-6″ in girth was extracted from all accessible reserves situated within an economical radius from Russellkonda. The working plan prescriptions were ignored and silvicultural considerations disregarded. The result is that almost all the accessible forests have been denuded of their best timber trees mature and immature. Among the unexploited forest a vast area has been under shifting cultivation ('podu') within comparatively recent years and contains very little mature timber. Since the saw mill no longer exists, the need to supply it with timber has also disappeared and it should now be possible to undertake the work of restoration of the overworked forests.

D. Minor Hill Forest.

78. *Description of the forest.*—*"The forest consists of mixed deciduous species and bamboos. The density of the growth, even on steep southerly aspects, is fairly satisfactory from the point of view of protection of the hill side. With the exception of patches here and there, as for example in Galleri Reserve, the quality is poor. Inferior timber species and bamboos form by far the greater part of the crop; but stunted small specimens of sal, *Anogeissus latifolia, Terminalia tomentosa, Adina cordifolia* and other hard woods of the main hill forests are generally to be found. There is however no doubt that simple coppice treatment in the forest on the lower slopes of the hills up to an elevation of perhaps 700 feet above the general level of the country would be practicable. In Ghumsur even in the very worst localities on hill sides or on broken ground regrowth is very rapid. Coppicing is very beneficial and involves no danger of exposing the hill sides to erosion."

79. *Coppice crops.*—Since 1919, fuel coupes have been worked in a few reserves to supply the local requirements. In the areas coppiced for fuel the resulting re-growth is satisfactory. In the early years the crop is an impenetrable mass of mixed species, thorns and climbers.

E. Plains Broken Ground Forest.

80. *Description of the forest.*—The broken ground type of forest is a characteristic feature of the plains of Ghumsur.—It can more or less be located on the Survey of India maps by the irregular contours interrupted by numerous streams and small water courses. The soil for the most part is extremely poor with gravel and limestone nodules often appearing at the surface. Much of the area consists of waste ground often entirely devoid of trees and sometimes of vegetation of any kind.

* "By comparison with forest of other types, growth on the broken ground is extremely poor. Mr. Gamble called it 'Sohun forest' from the fact that Sohun (*Soymida febrifuga*) is the chief important tree. Sal and other good timber trees abound but they are badly grown and usually almost useless. The soil is poor considered as forest soil, though some of it is by no means bad for agriculture. It varies very much. The most common types are greyish clay with nodules of lime, sticky akaline clay, 'red earth', and arid wastes of laterite gravel. Broken ground alternates with sal ground proper in such a way that they are difficult to separate.

"Sohun itself which appears to be a good heavy timber grows to trees of 4′-6″ in girth and regeneration is fairly abundant. The chief representatives of other good species that attempt to grow in the broken ground are *Terminalia tomentosa, Diospyros melanoxylon, Anogeissus latifolia, Chloroxylon Swietenia,*

whilst *Acacia leucophlœa A. sundra, Phyllanthus emblica, Woodfordia floribunda* and *Zizyphus xylopyra* are also abundant. Where such grounds have been cut over the coppice re-growth though poor enough is much more hopeful than the present crop."

F. Scrub Jungle.

81. *Description of the forest.*—The scrub jungle is situated on isolated outlying hills in the neighbourhood of villages. Though the growth is extremely poor the forest serves a very useful purpose in meeting the local demand for fuel and bamboo. The hills are low and do not exceed 1,300 feet in height. The slopes are strewn with bare rocks which crop out every where and hold small accumulations of soil in between them. The ground is usually dry and hard. The species commonly met with are *Bombax malabaricum, Kydia calycina, Odina wodier, Phyllanthus emblica, Cleistanthus collinus, Terminalia tomentosa, Anogeissus latifolia, Bassia latifolia, Diospyros melanoxylon* and various other thorny species and climbers. Of the bamboos, *Bambusa arundinacea* is found along the lower margins of the hills and *Dendrocalamus strictus* on the upper slopes. The tree growth is generally stunted, and crooked and branches at a low height.

82. *Coppice crops.*—Scrub jungle coupes have been worked for fuel since 1912–13, mostly in Kumarasuni, Tangarai and Sondasolia reserves. The coupes are often impenetrable with thorns, climbers and various miscellaneous species. In the oldest coupes now 17 years in age, individual stems of *Phyllanthus emblica, Terminalia tomentosa* and *Odina wodier* show girths from 14″ to 21″ and heights varying from 20 to 25 feet.

Section 2.—Injuries to which the Crop is liable.

83. *Fire.*—* " Forest fires are dangerous to young regeneration of all kinds. Grass and inflammable materials are not abundant in the forests; and this is particularly the case in all sal areas. But the effect upon the undergrowth of an accidental fire in an area that has been protected for several years is actually very marked. The effect upon sal trees above the sapling stage is not usually apparent, unless erosion has exposed the roots near the surface. Controlled fires, which are beneficial in 'damp' sal forests, are apparently unnecessary here. We have no trouble with soil sourness and accumulations of imperfectly decayed leaf mould."

Fires break out generally from the middle of February to about the middle of June. While the plains forests may be said to be comparatively immune from fire, the hills get constantly burnt in the hottest months of April and May. Fires are believed to be partly responsible for the paucity of sal regeneration in the ravine forests. On the hill slopes, regeneration of other valuable species like *Dalbergia latifolia, Pterocarpus marsupium* and *Chloroxylon Swietenia* is burnt back frequently and those that survive are prevented from growing into the sapling and pole stage.

84. *Drought.*—Drought very seldom occurs. In 1918 the monsoon failed and in the following year there was severe drought and wide-spread famine throughout Ghumsur. In the forest, thousands of sal trees were killed outright. From the eastern side of Kaliamba and Tiliki reserves, 3,015 dead trees of all sizes from 9″ to 3′-4″ in girth were extracted. It appears that two-thirds of the total number of trees removed from this locality belonged to the girth class of 12″ to 20″.

85. *Climbers.*—* " Climbers are the greatest menace next to fire. The most prominent species are *Bauhinia vahlii, Millettia auriculata* and *Calycopteris floribunda.* Climber cutting on a large scale has been carried out in the plains sal forests since 1900 and the condition of these forests is now favourable in respect of climbers. The crooked, unhealthy appearance of most of the

older trees in the plains sal blocks is sometimes due to shallow soil, but is also due to strangulation of the crowns by climbers in past years."

Sal in the sapling stage is particularly liable to be damaged by climbers in the early years. Two of the most prominent climbers that persist in the young sal crops are *Smilax zeylanica* and *Dioscorea anguina*. Both look more or less alike from a distance but the former has prickles, tendrills and clusters of round fruits whilst the latter produces tri-lobed fruits. In the plains sal timber coupes a noxious climber *Mucuna pruriens* (Baidangoa) makes its appearance within the first year of the crop's formation. The irritating pods are a great nuisance when the crop is to be cleaned.

86. *Growth cracks and bending.*—Sal in the sapling stage has the habit of developing a series of vertical cracks on the stem as a result of its rapid growth. The cracks commence to appear at the age of about two years and are due to the splitting of the bark. They cause the tissues to die on their edges and take sometime to heal over. To what extent the bark cracks allow ingress to wood-rotting fungi has not yet been investigated. Sometimes, termites build up mud galleries on the stems and invade these cracks. By devouring the dead tissues, the ants may prevent the cracks from healing over rapidly. The bark splitting continues until the age of about eight years when the stem gets coated with rough corrugated bark.

Another natural injury of a serious kind is the bending of stems which takes place when young crops are opened out unduly early and spaced widely apart. The growth of the saplings is so fast that they cannot stand by themselves without the support of their neighbours. When once a stem gets bent, it is unable to right itself. Auxiliary branches rise as leaders and their weight causes the stem gradually to droop further.

87. *Fungus*—(*a*) *Polyporus shoreæ.*—*"The sporophore of Polyporus shoreæ occurs a few inches above ground level. Where soil round the roots has been removed, it appears on exposed roots. It is a dark brown 'bracket', as big as a hat frequently, and quite unmistakable. The root-wood, or wood of the bole in an affected tree, has a partridge-speckled appearance. Where it occurs, the sal trees die off in an ever widening ring. It does not appear to be widespread as yet. The remedy lies, probably, in keeping pure sal crops 'open'. Whether continuous fire protection has any connexion with its appearance in the Ghumsur forests is uncertain."

(*b*) *Sal thicket fungus.*—The identity and life history of the sal thicket fungus are not yet known to Mycologists as the fruit bodies have not been observed hitherto. The disease is popularly called 'thread blights'. The fungus was first observed in Angul by Mr. Comber in 1916. It was noticed in Ganjam by Mr. Latham in 1917. The fungus is found on young overcrowded sal saplings either in the regenerated coupes or in the natural forest preferably in moist localities. Poles are free from infection. The mycelium takes the form of milky-white strands which ramify closely and extend from the infected point in all directions. The appearance thus produced is not unlike that of a patch of white-wash. From the stem the mycelium spreads to the branches and leaves which are killed outright. The infection may also commence from the leaf, in which case the thread-like strands branch extensively on the under-surface of the leaf which is gradually killed towards its base. Thence the infection is continued on to the branch and from the branch to the stem. Various other undergrowth species like *Ixora parviflora*, *Desmodium* and *Millettia auriculata* are also attacked. It thrives equally well on dead grass and decaying leaf litter on the ground. The commonest ways in which it spreads from sal to sal are through contact of infected leaves and twigs, through wind blown leaves and through climbers as well as shrubs. In the crops that are opened out to light and air in cleanings or thinnings the fungus does not make itself very evident, neither is it found on sal in the pole stage. From the evidence that is available it does not appear to cause any widespread damage in Ghumsur.

(*c*) '*Horse hair blight*'.—Another threadlike fungus which commonly runs up young sal stems goes by the name of 'horse hair blight'. It is black unlike the 'thicket fungus' and has the characteristic appearance of a horse's hair. These fungi have been identified in Dehra Dun as being the rhizomorphs or the sterile stage of a Marasmius, probably *M. sarmantosus*. It is not known to be parasitic.

(*d*) *Heartwood rot*.—Most of the unsoundness in sal timber is caused by heartwood rot that destroys the wood tissues and renders them whitish, soft and powdery. The disease is locally known as 'kothua.' Its widespread pre-valence among the Ghumsur sal became evident when the Russellkonda Saw Mill undertook to cut sal logs on an extensive scale. In many cases the trees when felled show the rot at the cut ends. But there are also many instances in which it is impossible to detect the internal rot by any recognizable outside symptoms. It is believed that the unsoundness met with in the old sal trees is largely due to the unfavourable conditions under which the present sal forest originated. It is possible to eliminate many of those adverse factors by the correct tending of the newly established crops.

88. *Insects*.—The insect pests of sal may be classified under (*a*) borers, (*b*) defoliators and (*c*) termites.

(*a*) *Borers*.—The most prominent borer is *Hoplocerambyx spinicornis* commonly called the sal heartwood borer. It is a Cerambycid beetle. It passes through an annual life cycle and the beetle emerges in the early part of the monsoon. The larva bores under bark and then entering the heartwood con-structs a deeply seated pupal chamber in which it spends the cold weather and the first six months of the following year. The larva may grow to a length of about 3 inches boring tunnels of a diameter of 1 inch. The wood is completely riddled and rendered useless as timber. The damage is locally known as 'sambar akhi' or sambar's eye. In Ghumsur the pest has not, up to date, assumed an epidemic form.

Of the other borers a shot-hole borer occasionally pierces young sal saplings all over and kills them outright. Another borer gains entry into sal saplings and makes vertical tunnels. Its presence can be detected only when the stem is split open in the middle. The larva and adult of a cockchafer are fond of destroying germinating sal seeds by living upon the developing cotyledons. They may easily be found in a dump of sal seeds.

(*b*) *Defoliators*.—* "One of the defoliators *Ingura subapicalis*, a cater-pillar, appears occasionally in the hot weather and strips trees of their new flush of leaves almost entirely over stretches of forest. The efforts of the local birds to attend to this nuisance have been half-hearted and inadequate. The pest on a large scale is only occasional. Another defoliator is a bag-worm (*Family Psychidæ*) species not identified. It makes a speciality of sal regenera-tion and is a serious nuisance without being a real menace. Nothing special can be done to combat these defoliator attacks. In open crops, however, insect pests have less harbourage than in dense entanglements. There are many other caterpillars that defoliate sal to the best of their ability. The larva of the Tussore Silk moth, for example, and a tiresome green, spiny caterpillar that administers a painful sting."

(*c*) *Termites*.—The Ghumsur termite has been identified by a specialist in Italy to be *Odontotermes obesus* which is one of the commonest mound building termites in India. In 1922 when an experimental thinning was made in Suradevi a number of standing sal stems about 5 years old appeared to have been girdled by what were then suspected to be white ants. Subse-quently in 1924, Dr. C. F. C. Beeson of the Dehra Dun Forest Research Institute visited Ganjam and made brief observations. With reference to the growth cracks that appear on the smooth bark of young sal he said :—" Under certain conditions these fissures are invaded by termites under the cover of mud galleries and the walls of the fissures are eaten away for $\frac{1}{4}$ to $\frac{1}{2}$ inch. Living moist cortex

is definitely removed. Further splitting occurs at the apex of the fissure and in later attacks its interior is deepened until the cambium is exposed. From this period callous forms at the edges of the wound and that in turn may be checked by termite action so that the area of exposed wood increases. The wood dies and decays but does not appear to be eaten by the termites. The termites pass from one bark fissure to another on the sal sapling by galleries of mud. At places on the smooth bark irregular patches under these galleries may be eaten of the apparently healthy cortex as much as half way down to the cambium. No cases of excavation down to the wood were observed. The wound in the bark readily heals over when the gallery is abandoned."

One noteworthy fact which has emerged is that the girdling of stems detected first in the Suradevi plot has never again been observed to any alarming extent in the regenerated coupes although similar thinnings have been carried out on an extensive scale. The writer has had the opportunity of examining several hundreds of stems in connexion with the testing of unsoundness in young sal. He is of the opinion that the majority of the healthy saplings recover from the white ant attack. Most of the damage that was observed has arisen through wounds that are caused to the healthy stems by various agencies, natural or otherwise. Wherever the tissues rot, the ants do not spare them. Fungus to a certain extent helps and encourages white ant attack by killing first the living tissue and then leaving it for the termites to complete the work. Where the heart rot starts at the base of the tree, the white ant has also been observed to follow it up from underneath the ground.

89. *Wild animals.*—* " Our sambhur are attracted by the idea of ' concentrated regeneration ' in clear-felled areas and damage the young shoots very seriously. They lose interest in the regeneration only when it has attained a height of 5 or 6 feet. Other deer rub their horns against the stems and do a certain amount of injury. Wild elephants do some damage in the Chandragiri sal areas and near Gogodo ; but we have comparatively few of them. Cattle browse on sal regeneration if allowed to do so. Grazing has been excluded from the more important plains sal forests since 1903."

Besides the animals mentioned above, pigs eat germinating sal seeds with avidity and monkeys too occasionally indulge in this practice. The pink hypocotyl and the yellow radicle attract the attention of these animals. Bison too are fond of browsing upon the tender sal shoots. We have by now regenerated some 2,000 acres of the first and second quality sal forests. The browsing problem never came to the slightest prominence until very recently when it was noticed that certain isolated small coupes in Kriamba reserve appeared to have been heavily browsed by deer and bison during the early part of 1930. The leaders of a great many well grown stems had also been violently broken off at a height of 3 or 4 feet above ground. In most cases the damage followed the opening up of the crop in the first or second year cleanings but not before. In the Ghumsur forests, the deer population is not large and there are enough tigers to check the increase of deer. The few instances of deer browsing noticed in Kriamba reserve can only be attributed to the absence of tigers in that part of the forest and to the small size and secluded situation of the regenerated coupes. In Ghumsur, as a rule, browsing is not a factor of any importance in the natural regeneration of sal.

90. *Man.*—By far the greatest injury is due to man who sets fire to the forests during the hottest part of the year. The absence of good natural regeneration over a great part of the hills is directly traceable to severe forest fires. Hill slopes are fired to facilitate the tracking of game and the collection of jungle fruits, honey, etc. On roads and rights of way, the forest is fired on either side to reduce the undergrowth and thus minimise the fear of attack by tiger. Man is also responsible directly or indirectly for various other forest offences. Thefts of timber from reserves are not very common. Thefts of fuel and small poles are of frequent occurrence in the outlying reserves particularly in Russellkonda range. Timber transit rules are in force within the area of Ghumsur and appear to work satisfactorily. The number of forest offences

in recent years has varied between 600 and 700 in a year. The following is a list of the number of offences occurring in the years 1919–20 to 1929–30 :—

Year.	Offences under: Injury from fire.	Unauthorized fellings.	Unauthorized grazing.	Other offences.	Total.	Compounding fees collected.
						RS.
1919–20	25	405	44	15	489	2,158
1920–21*	63	281	20	10	374	1,964
1921–22	102	397	26	31	556	2,327
1922–23	57	496	27	25	605	2,895
1923–24	66	488	21	6	581	3,852
1924–25	57	553	45	5	660	7,587
1925–26	65	578	64	25	732	4,520
1926–27	11	513	32	15	571	2,966
1927–28	74	427	55	22	578	3,780
1928–29	44	419	34	34	531	4,667
1929–30	66	519	64	19	668	5,222
Average	57	461	39	19	577	3,813

* In 1920–21 the forest year changed to financial year. Hence the figures are for nine months only.

SECTION 3—FAUNA.

91. *Wild fauna.*—In his working plan for a part of the Ghumsur forests Mr. S. Cox wrote in 1903 as follows :—" The forests are poorly stocked with game. Bears are still very common, but are not found in the numbers which years ago made Ghumsur celebrated for them. A jailer of the Russellkonda jail was credited with having shot 147 bears ; while in the districts, an officer of the Public Works Department is known to have shot 60 from 1890 to 1895. Sambhur, nilghai, wild pig and jungle sheep are found but are all too harassed by the Kondhs to increase rapidly with forest reservation. Spotted deer are common in the scrub jungle on the plain and a few tigers are always to be heard of."

Since the above was written similar conditions hold, but game of every sort has probably decreased. Besides these animals panthers are found in almost all reserves and wild dogs too are seen in some places. Bison are confined to certain tracts in Ambazora, Gundribadi and Gogodo Reserves and also in Kriamba, Pippalaponka and Pondakhol Reserves. Wild buffalo is rare and has been seen near Gopodaro enclosure in Ambazora Reserve. There are a few elephants. A small herd consisting of a tusker, a cow and a calf makes their permanent abode in the Chandragiri Reserve but they wander extensively over Kukuluba and Bontha ranges in search of field crops. Another herd of about four elephants roam freely in Pondakhol reserve and occassionally visit Pippalaponka. They are not in the habit of damaging the young trees to any serious extent. Only one elephant is known to have been shot in recent times. He was a rogue tusker who did lot of damage to the field crops as well as to men including a Forest Officer who sustained a broken leg in 1924. The rogue was ultimately shot by Mr. Minchin in October 1925. Man-eating tigers have particularly come into prominence in Kukuluba and Bontha ranges. In 1927–28, thirty-two men were killed around Tarasingi. It is believed that the tiger who was responsible for the crime has died a natural death. Other animals of interest met with occasionally are mouse-deer and Malabar squirrel. Among game birds, pea-fowl, jungle fowl, and spur fowl are common.

92. *Indiscriminate destruction of game.*—Although the Ghumsur forests form the most densely wooded part of the Ganjam district, every Forest Officer knows that it is even now ill stocked with game and this in spite of several years of forest protection. In 1907 Mr. S. Cox, the District Forest Officer, commented on the widespread prevalence of illicit shooting in the reserved forests and attributed it to the large number of professional shikaris with whom the forest guards were in league for their periodical supply of fresh meat. Kondhs, the jungle men of the district, were also in the habit of carrying out organized beats and hunting sambhur and other kinds of deer to death. In recent years, man-eating tigers have come unduly into prominence and there is reason to suppose that this is partly due to the diminution of game animals which form the natural food of the carnivora.

Modern firearms in the hands of professional shikaris are deadly weapons, and far more efficient than the old muzzle loaders. Such men disregard all rules and destroy male and female alike, so that modern conditions make any effective preservation of game, a difficult matter. An investigation has been made into the number of gun licences in force in 1920 and the number which has been taken out in 1930 within the limits of Ganjam district and in Ghumsur in particular.

Number of Gun licences other than revolvers and pistols.

	In 1920.	In 1930.
(a) Ghumsur division consisting of Ghumsur, Surada and Aska taluks.	247	602
(b) Rest of Ganjam district	573	1,282
Total ..	820	1,884

The results show that the numbers of gun licences in Ghumsur revenue division, where all the Reserved Forests are concentrated, have increased about three-fold within the last ten years, and the present number is as much as one-third of the total for the whole district. The number of special licences issued for shooting game inside the reserved forests is given below. The cost of a shooting licence is Rs. 10 per year.

Year.	Number of shooting licences issued.	Year.	Number of shooting licences issued.	Year.	Number of shooting licences issued.
1920	2	1925	10	1929	5
1921	3	1926	6	1930	2
1922	6	1927	13		
1923	4	1928	8	Total ..	65
1924	6				

Unfortunately there is no record in the District Forest office of the number and description of animals shot inside the reserved forests. The special licences taken out for the pursuit of game in the Reserved Forests are comparatively few, but in view of the disparity between the number of gun licences and special licences extant, there is no doubt that poaching goes on, with or without the knowledge of the subordinates. In addition to this danger from professional shikaries, another growing menace is that the local population take out licences for protection of their field crops but use their weapons illegitimately at all times of the year in slaughtering game. In regard to this illicit shooting in the Reserved Forests, the Chief Conservator of Forests has drawn special attention to the matter in his Proceedings, Mis. No. 488, dated 25th November 1929. Unless legislation controlling the widespread destruction of the wild fauna of India is introduced, there seems to be little that the Forest Department can do to protect the game in their reserves. A most potent measure would be to restrict the number of gun licences issued to the local population, but this, apparently, is in opposition to the present policy of Government.

CHAPTER III.—UTILIZATION OF THE PRODUCE.

SECTION 1.—AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION.

93. *Local population.*—* " The population is principally Oriya. In Pondakhol range in the Agency, there are 2,000 Oriyas in the open country and 1,300 Kondhs in the forest enclosure villages. In the plains ranges (Chokkapad Agency excluded) there are 217,000 Oriyas ; and 11,500 Kondhs in the more jungly parts. Of the 230,000 and odd inhabitants 1,000 are Christians, 700 are Muhammadans and the remainder are Hindus. The population of Ghumsur is at the rate of about 426 per square mile. The largest towns are Russellkonda 6,000 inhabitants, and Surada 4,000. There are in Ghumsur 640 and odd villages. Of these 40 have populations of over 1,000. All castes are agriculturists. Paddy cultivation is the staple occupation. There are no important technical industries as yet. A comparatively small proportion of the land is under irrigation. The major part grows rainfed paddy and a little ragi, sann-hemp and gingelly. Usually one crop per annum is grown. Conditions are so favourable that rainfed paddy is almost as safe a crop as irrigated paddy. The value of land

freshly cleared of forest is on an average about Rs. 50 per acre. The same land terraced and bunded for growing rainfed paddy is worth Rs. 100 to Rs. 200 per acre according to soil and locality."

94. *Their requirements.*—The local population need sal poles up to 3 feet in girth for house building purposes and agricultural implements, fuel, bamboos and thatching grass. The demand for grazing is limited and the minor forest produce is not much sought after. The Kondhs of Ghumsur living in the forest enclosures and in the neighbourhood of the reserves enjoy free concessions of forest produce sufficient to meet practically, all their domestic needs. Unreserved 'bunjar' lands bearing tree growth are sold every year according to the demand for cultivation and they also supply partly the requirements of the people. Even the poorest class will not look at anything other than sal for house building and agricultural implements. Timber of large sizes over 3 feet in girth is consumed only in small quantities. Most of it is exported to places outside Ghumsur.

Section 2.—Markets and Marketable Products.

95. *Local markets.*—Russellkonda and Surada are the centres of the timber trade in Ghumsur. Russellkonda is supplied by four out of the seven ranges, namely Russellkonda, Mojjagoda, Kukuluba and Bontha. The market of Surada gets its supplies from Surada range and from the Bodogoda and Korada zamindaries. A third but lesser market is Buguda which requires a limited supply of timber from the reserves of Buguda range. These three markets are situated at the ends of the three main export routes which converge on Berhampur, the nearest station on the Bengal-Nagpur Railway. At Russellkonda and Surada there are contractors who have established regular business for upwards of 15 years. All of them are small timber merchants who ply their trade with capital often borrowed from the sowcars. Competition brings into the field petty adventurous men who disappear from the trade with the rapidity with which they enter.

96. *The Russellkonda Saw Mill.*—For the six years, from April 1922 to June 1928, the Russellkonda Saw Mill, owned by Government and managed by Messrs. Parry and Company absorbed nearly the whole of the output of sal from these forests and this dislocated seriously the local timber trade. During the period of its existence the saw mill placed on the market 343,979 cubic feet of timber. The bulk of this timber was exported from Berhampur to various places on the railway. The prominent foreign markets supplied by the saw mill were Chicacole, Vizianagram and Vizagapatam. The saw mill tested the Calcutta and Madras markets, but did not in those cases succeed in establishing a profitable trade. One important result of this enterprise was to establish a reputation for Ghumsur sal, in places outside Ghumsur. It was however not, on the whole, a success, partly due to the fact that the machinery installed was too big for the sal timber available and that the other species, which did grow to bigger sizes, did not pay to convert ; and partly due to the fact that the percentage of unsoundness in the sal timber was very high. In the light of the valuable experience we have gained in the Presidency, during the past decade in forest saw milling generally, it is apparent that it is a sound policy in such cases as this to sell our timber in the log and leave its conversion to private enterprise. Since the mill closed down two years or so ago the timber trade has come back into the hands of the Ghumsur contractors who should now be able to build up again their trade in round timber.

97. *Markets outside Ghumsur.*—The nearest market on the railway is Berhampur, a town of 33,000 inhabitants with a lead of 50 miles from Russellkonda. Almost all the large timber available in Ghumsur must come down ultimately to Berhampur before it is exported to places abroad. Timber from the Zamindari forests also reaches Berhampur where a great deal is sawn up for local consumption as well as for export. Some timber in the round, and even poles, are carried by carts to distant towns like Ichapur, Sompet and other places in Ganjam district.

In order to study the present condition of the market for sal, a careful analysis has been made of the quantity of timber sent by rail from Berhampur to other markets on the railway during the past three years from 1927–28 to 1929–30. The timber refers to sal only as there is little export of other species. The statistics that are represented in the statement below may be examined in the light of the facts that (1) in 1927–28 the Russellkonda Saw Mill was working in full swing (2) in 1928–29 the mill closed after working for the first three months and (3) in 1929–30 there was no saw mill. It is to be noted that the markets do not extend beyond Ganjam and Vizagapatam districts. If the three important markets alone are considered, Vizianagram easily ranks first as the principal customer for Ganjam sal and next in order of importance comes Chicacole and then Vizagapatam. Owing to the closure of the saw mill there has naturally been a decline in the export of sawn timber. But the trade in round logs has shown a remarkable ascent from 142,524 cubic feet in 1927–28 to 220,921 cubic feet in 1929–30. These figures enable us to answer the question 'Has the market for round timber declined as a result of the closure of the mill'? Assuredly not. Taking the average for the last three years the export trade shows clearly that the markets on the railway could absorb as much as 188,804 cubic feet of timber in the round or a total quantity of 256,366 cubic feet of round and sawn timber. This demand is considerably in excess of what the Ghumsur forests will be able to supply in the next ten years.

Statement of export of timber from Berhampur Railway station to other markets on the railway from 1927–28 to 1929–30.

Serial number and station to which exported. (1)	Distance in miles. (2)	Saw mill year. 1927–28. Round. (3)			3 months—Saw mill. 9 months—No saw mill. 1928–29. Round. (6)		
		Round. (3)	Sawn. (4)	Total. (5)	Round. (6)	Sawn. (7)	Total. (8)
	MILES.	C.FT.	C.FT.	C.FT.	C.FT.	C.FT.	C.FT.
1 Vizianagaram	134	78,165	10,086	88,251	113,424	5,848	119,272
2 Chicacole Road	91	6,938	32,501	49,439	11,664	16,248	27,912
3 { Vizagapatam / Waltair }	172	17,615	11,743	29,358	13,209	2,308	15,517
4 Ponduru	100	8,808	5,317	14,125	15,587	7,508	23,095
5 Dusi	95	6,606	613	7,219	8,808	128	8,936
6 Chipurupalli	115	1,101	4,363	5,464	6,606	1,604	8,210
7 Tilaru	79	4,404	8,763	13,167	2,734	4,780	7,514
8 Palasa	37	6,606	389	6,995	9,908	105	10,013
9 Sigadam	107	6,606	316	6,921	5,631	242	5,873
10 Ballugam	48	..	13,816	13,816	6	240	246
11 Nowpada	62	..	2,108	2,108	161	5,193	5,354
12 Khallikote	37	..	35	35	2,200	297	2,497
13 Thirty-two other stations	..	5,675	17,251	22,927	13,028	8,002	21,029
Total		142,524	107,301	249,825	202,966	52,503	255,468
Equivalent in tons		2,850	2,146	4,997	4,059	1,050	5,109

Serial number and station to which exported.	No Saw mill. 1929–30.			Average for 3 years.		
	Round. (9)	Sawn. (10)	Total. (11)	Round. (12)	Sawn. (13)	Total. (14)
	C.FT.	C.FT.	C.FT.	C.FT.	C.FT.	C.FT.
1 Vizianagaram	140,971	1,387	142,358	110,853	5,774	116,627
2 Chicacole Road	22,158	9,723	31,881	13,587	19,490	33,077
3 { Vizagapatam / Waltair }	8,808	1,506	10,314	13,211	5,185	18,396
4 Ponduru	9,042	3,993	13,035	11,145	5,606	16,751
5 Dusi	4,404	10,330	14,734	6,606	3,690	10,296
6 Chipurupalli	11,114	327	11,440	6,273	2,097	8,370
7 Tilaru	352	2,145	2,497	2,497	5,229	7,727
8 Palasa	..	811	811	5,505	435	5,940
9 Sigadam	3,439	1,211	4,650	5,226	589	5,815
10 Ballugam	33	123	156	13	4,727	4,739
11 Nowpada	..	1,521	1,521	53	2,941	2,994
12 Khallikote	2,202	1,086	3,288	1,468	474	1,941
13 Thirty-two other stations	18,398	8,725	27,123	12,367	11,326	23,693
Total	220,921	42,888	263,808	188,804	67,563	256,366
Equivalent in tons	4,418	858	5,276	3,776	1,351	5,127

NOTE.—The figures were first tabulated in railway maunds and then converted into cubic feet by applying the following values; $27\frac{1}{4}$ maunds : 1 ton : 50 cubic feet. The export in terms of cubic feet would be better appreciated than that in terms of maunds. Vizagapatam and Waltair are clubbed together to form the Vizagapatam market.

98. *Methods of marketing.*—From April 1922 to July 1928 the Russellkonda Saw Mill was the chief agency for marketing the Gumsur sal. The saw mill was owned by Government and managed by Messrs. Parry and Company. The extraction of timber from the forests, the selection of the straightest and most flawless sal logs, and the transport of timber from the forest to the saw mill were all carried out under the control of the Forest department. The saw mill, working as an independent concern, converted the sal logs into saleable scantlings canvassed orders and effected sales. The saw mill owned a depot at Berhampur railway station which acted as the intermediary for receiving the timber sent from Russellkonda and railing it to purchasers. At Vizagapatam, Messrs. Gordon Woodroffe acted as the agents for the mill. Similarly at Calcutta, the agents were Messrs. Parry and Company. The selection of only the best sal logs for the mill resulted in considerable quantities of defective and unsound timber being rejected. The sales of these ' rejects ' were effected by the District Forest Officer in public auction, as were also the sales of the coupes of the Plains Sal Timber Working Circle and of the Ravine, Pole, Fuel and Bamboo Working Circles and of the minor forest produce. Since the closure of the saw mill, all the agencies connected with it have been wound up and the sale of every kind of produce is now being effected by the District Forest Officer in auction.

99. *Marketable products.*—The chief marketable products are timber, poles, firewood, bamboo and minor forest produce. Owing to the long lead of 52 miles from the principal local market to the nearest railway, every class of forest produce is under a severe handicap in reaching the consumer at an economic price.

(*a*) *Timber.*—Timber in the round is mostly obtained from the plains sal forests, ravine and mixed hill forests. The timber trade is principally concerned with sal. The demand for other species is practically limited to *Pterocarpus marsupium, Adina cordifolia* and *Terminalia tomentosa.* Timber of large size has very little use locally and is therefore exported to places outside Ghumsur. The principal timber trees and their chief uses are given below with the species arranged in alphabetical order. This is taken largely from Mr. Minchin's Working Plan.

Botanical name.	Oriya name.	Uses.	Remarks.
1. Adina cordifolia ..	Holondo ..	Palanquins, rafters, planks, shingles, furniture dug-outs, etc.	Extensively used locally and exported to Berhampur.
2. Anogeissus acuminata.	Pasi ..	Dug-outs	
3. Anogeissus latifolia ..	Dhau ..	Axles and ploughs ..	The Oriyas have a prejudice against this tree but use pole sizes for axles. Exported to Vizagapatam.
4. Bassia latifolia ..	Mowlo ..	Cattle troughs	Cattle are supposed to relish their drink best when given in these troughs.
5. Bridelia retusa ..	Kosi ..	Poorer classes of house-building.	Said to be resisteant to white ants and fire.
6. Bursera serrata ..	Soropotri-mohi.	House-building and door frames.	
7. Chloroxylon swietenia.	Bheru ..	Fancy boxes, rice pounders, yokes.	Timber of any considerable size is rare.
8. Cleistanthus collinus ..	Korada ..	Rafters, poorer classes of house-building and better class thatch bungalows.	Hard, durable and resistant to white ant. Grows only to small sizes.
9. Dalbergia latifolia (Rose wood).	Sissua ..	Furniture	Large straight timber is rare.
10. Diospyros melanoxylon.	Kendu ..	Furniture, scale beams, rulers, walking sticks.	Trees are generally faulty. Proportion of heart wood usually small.
11. Eugeina jambolana ..	Jamo ..	Planks, door frames ..	Fruit of one variety is eaten.
12. Gmelina arborea ..	Gombari ..	Palanquins, yokes, furniture, motor-bus bodies.	Trees are rare, but find a ready sale to carpenter in Berhampur.
13. Grewia tiliaefolia ..	Dhamano ..	Axe handles, Kondh cots, Kavadi sticks, cross pices of cart frame.	A strong and flexible wood.
14. Lagerstroemia parviflora.	Sidha ..	House poles and rafters.	
15. Ougenia dalbergioides.	Bhandano ..	Wheel boxes	Large straight timber is rare.

Botanical name.	Oriya name.	Uses.	Remarks.
16. Pterocarpus marsupium.	Piasal ..	Door frames, planks and furniture.	Seldom available in plank over 1 foot in breadth.
17. Schleichera trijuga ..	Kusumo ..	Oil churners, sugarcane grinders, ploughshares and axles.	
18. Shorea robusta (Sal) ..	Saluva ..	For building purposes, sleepers, posts, spokes, cart frames, ploughs and all purposes for which strength and durability are required. It is not well suited for planking under 1½ inches in thickness owing to its tendency to warp.	There is a greater demand for sal than for all other timbers combined.
19. Soymida febrifuga ..	Somi ..	Temple building, troughs for cattle, rice punders garuda stambalu in tanks, well curbs.	
20. Stephegyne parvifolia.	Mundimundi.	Planks	Often passed off as Holondo but inferior to it.
21. Terminalia arjuna ..	Arjuna ..	Dug-outs and house-buildings.	Dug-outs last about 3 years. Exported to Vizagapatam and passed off as Sahajo. Highly resistant to white ant attack.
22. Terminalia tomentosa.	Sahajo ..	Building purposes, not used in contact with earth.	Not much used locally, but exported.

(*b*) *Poles.*—Poles of various species are available in the plains third quality sal forests and to some extent in the plains sal timber and ravine forests. The local demand is chiefly for sal poles up to about 3-foot midgirth under bark. The poles are extensively used in the construction of the poorer class houses throughout Ganjam. The pole forest will be capable of yielding considerable revenue only when the problem of the railway connecting Russellkonda with Berhampur is solved.

(*c*) *Firewood.*—The demand for firewood is purely for local consumption. Wood for fuel is available in unlimited quantities in all classes of forests. The present requirements are mainly met from the coupes opened in the plains sal pole forests as well as from the minor hill and scrub jungle forests. Prior to 1920, there was little charcoal burning in Ghumsur. Since then, the coupe contractors have begun to recognize the advantage of converting the unsaleable firewood into charcoal and to place it on the market.

(*d*) *Bamboos.*—Two species of bamboo grow in the forests, *Dendrocalamus strictus* and *Bambusa arundinacea.* The former is found in abundance and the latter in comparatively small quantities by the side of the stream banks. *Dendrocalamus strictus* is largely used for the construction of the poor people's houses, for supports in the cultivation of sugarcane and for basket-making, which is a flourishing industry at Bellugunta. *Bambusa* is sparingly used for fencing purposes. The demand for bamboos is local.

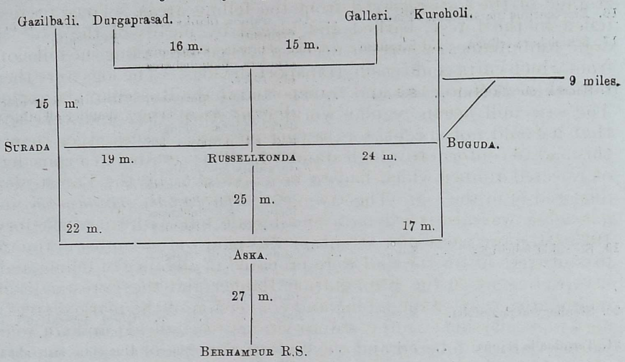
(*e*) *Minor forest produce.*—The minor produce of the reserved forests is enjoyed freely by the Kondhs as a concession. They collect jungle fruits, arrowroot, flowers and seeds of *Bassia latifolia*, fibre, wax, honey, etc. The bark of *Cassia Fistula* (rela) is occasionally leased out by the Forest Department. Small quantities of other produce such as thatching grass, fibre, stones, metal and gravel are also sold on permits. There is very little trade in the minor produce.

SECTION 3—LINES OF EXPORT.

100. *Lines of export.*—The three primary export routes are—

	MILES.
(1) Russellkonda to Berham purrailway station	52
(2) Surada to Berhampur railway station	49
(3) Buguda to Berhampur railway station	44

Diagram of export routes.



These routes lead from the three principal markets of Ghumsur, meet at Aska and thence proceed by a common route to Berhampur station on the railway. They are metalled roads kept in tolerably good condition by the Ganjam District Board. The central market, Russellkonda, is connected by roads on either side with Surada and Buguda. Close to Surada, there are two unbridged rivers, the Joronadi and the Rushikulya. On the side route from Russellkonda to Buguda there are two unbridged rivers, the Bodonadi and the Budanadi. They get flooded in the rainy weather and hamper the timber traffic. The bridging of two of these rivers, the Joronadi and the Budanadi is under consideration by the District Board and no doubt the other rivers too will be bridged eventually. From the local markets, other branch roads run into the interior of the forests. The chief lines are (*a*) the Russellkonda-Udayagiri road which runs for 16 miles through Mojjagoda range up to Durgaprasad, (*b*) the Russellkonda-Galleri road, 15 miles, (*c*) the Surada-Gazilbadi road, 15 miles and (*d*) the Buguda-Kurcholi road, 9 miles. All these roads are under the control of the District Board.

101. *Need for a road through Tarasingi to Gayagonda and Rudapodaro.*—From the forest point of view, great need has been felt in past years to extend the road communication to Tarasingi and thence to Gayagonda and Rudapodaro. Tarasingi is the headquarters of two important ranges containing some of the most valuable forests in Ghumsur. The rich forests situated on either side of the Tarasingi-Kukuluba Valley cannot be worked with adequate financial results unless a good metalled road is made. In the absence of even tolerable roads in a tract infested by tigers and sometimes elephants, it has always been a difficult matter to induce contractors to buy anything from the forests around Tarasingi. The prevalence of fever adds to these difficulties. Recently a plains sal timber coupe in this locality, the felling of which was prescribed in the working plan, had to be left unworked, and another area in a more accessible range substituted for it. The only solution appears to be to open up the country by the construction of a metalled road. It should run from Tilisingi through Tarasingi and Gayagonda to Rudapodaro for a distance of 16 miles. From there two branches should ultimately lead to Gogodo and Bodogundribadi. This project would have considerable justification from the standpoint of general administration alone ; apart from the fact that it should be profitable as shown in paragraph 385 of Part II.

SECTION 4.—METHODS OF EXPLOITATION.

102. *Exploitation for the Russellkonda Saw Mill.*—During the past decade, departmental extraction of timber was undertaken solely for the sake of the Russellkonda Saw Mill. Exploitation commenced in 1920 in advance of the opening of the saw mill. An exploitation unit was formed with a special ranger in charge of most of the fellings that were carried out for the mill and he was further responsible for taking receipt of the logs sent by the territorial Range

Officers. An exploitation depot was also maintained at Russellkonda for the storage of the logs received from the felling areas. Trees fit for the mill were felled in the forest, barked and logged by means of the axe. Dragging was done by buffaloes, wherever necessary, especially along the hill slopes, to a point from which carts could easily transport the logs. The logs were then loaded on to bullock or buffalo carts and transported to the Russellkonda exploitation depot. The saw mill began regular working in April 1922 and very soon discovered that it could not accept for sawing purposes species other than sal, and even this had to conform to a high standard. This resulted in a considerable quantity of rejected timber which had to be taken over by the Forest department and disposed of in the log. The sawing of *Pterocarpus marsupium* and *Terminalia tomentosa* was also tried on a small scale but with unsatisfactory results. In 1923–24, more particular attention was paid to the timber extraction. Marking lists of trees fit for the mill were prepared in advance of felling and copies of the lists were sent to the Exploitation Ranger and the Forester in charge of each felling area. After the felling and conversion of the marked trees, the resultant logs were classified at the stump site as (*a*) mill log and (*b*) reject. The logs were serially numbered and their measurements of length, midgirth under bark and cubical contents, based on quarter girth tables, were recorded in the register in form 8. The tree number was to be written on the left hand side and the date of receipt in the exploitation depot, on the right. The word "Mill" or "Reject" was also to be noted against each log. Registers in forms 7 and 9 were dispensed with. The 'reject' logs were usually sold at stump site or sometimes after dragging them to the nearest cart-track. In 1924–25, the system outlined above continued. In 1925–26, the exploitation unit was abolished and the depot at Russellkonda was transferred to the hands of the mill agent. The exploitation of timber as well as its transport to the saw mill were placed under the territorial Range officers. The logs were then consigned to Russellkonda under the cover of printed invoices showing the number, girth, length and cubical contents of each log. The invoice forms were in triplicate and they were drawn out by the Forester or subordinate in charge of the felling area. The saw mill on receipt of the logs returned one copy of the invoice with corrections wherever necessary, to the concerned Range Officer who then made payments of transport charges to the cartmen. Shortage in the mill stock often necessitated a rush to put as many logs into the mill as speedily as possible. This was evident in the latter years of the working of the mill when the system of exploitation appears to have become disorganized. The marking and felling of trees would go on at the same time, and simultaneously in several felling areas, under inadequate supervision. Invoices of logs were sometimes drawn out on the route of transport instead of at the place wherefrom they were consigned and the entries were often incorrect. Reject logs were sold to contractors and their removal permitted from the felling areas that had not been cleared of the logs fit for the saw mill. Consequently confusion arose in the timber accounts and the loss of several logs from Rogoda and Baiballi reserves may be attributed to these causes. In 1927–28 efforts were made to resuscitate systematic exploitation. For the first time marking lists and detailed estimates were prepared a long way ahead of fellings. The felling areas were sub-divided into divisions and fellings restricted to one division at a time. The maintenance of registers in forms 7, 8, 9 and 10 were insisted upon as well as detailed stock taking in forest depots, which hitherto had been done in a haphazard manner. Considerable difficulties were encountered in procuring the requisite number of private carts for departmental transport of timber. There were several other obstacles in the way of keeping the mill adequately supplied, e.g., inadequacy of staff, increased proportion of unsoundness in the felled timber, shortage in the mill stock, etc. All this caused a severe strain upon the whole of the district staff in 1927–28. The saw mill was closed finally in June 1928 and since then there has been no further departmental extraction of timber. The efforts of the staff were then concentrated on the disposal of the rejected timber which had accumulated to about three and a half lakhs of cubic feet.

103. *Exploitation through contract agency.*—Departmental extraction of timber, for the saw mill, has been considered above. The only other method

of exploiting the produce is by sale of the standing growth of the annual coupes in the Plains Sal Timber, Ravine, Pole, Fuel and Bamboo Working Circles. Coupes are demarcated on the ground and advertised for sale. A public auction is held by the District Forest Officer and the contractors bid for the coupes at so many rupees per acre. The bamboo coupes are valued as a whole and not on the basis of fixed rate per acre. Similarly, the minor forest produce is sold for the range as a whole. The contractor is usually allowed a 'voidah' of one year for the clearing and removal of the standing forest. He employs felling coolies and transports all useful timber to his permanent depot in one of the local markets or he carts it to a temporary depot opened in the nearest village. Fuel and bamboo are removed by the consumers themselves. Any produce that is removed from a contractor's coupe must be covered by C. Form permits issued by the contractor or his accredited agent. Where concentrated fellings take place, this system of working coupes through the agency of contractors has been found to be quite successful, and may continue in the future. Where fellings are, however, scattered, as in forests to be exploited by the selection method, departmental working alone will give satisfactory results.

104. *Means of transport.*—Carts hauled by bullocks or buffaloes are the only means of transport. The carts are fitted with wooden axles made of *Anogeissus latifolia.* They cannot therefore carry heavy loads of timber. An average cart-load is about 16 cubic feet. Logs are generally cut down to a maximum length of 20 feet or a volume of about 25 cubic feet. To facilitate the carting of large sizes to the saw mill, the Forest department made some attempts in 1926 to introduce steel axled carts by supplying them to approved villagers on loan repayable in instalments. The innovation met with little or no success. Steel axles alone cost about Rs. 10 each and they are expensive to an ordinary villager. Further, the bullocks are of a very inferior type and are incapable of hauling heavy loads. In the cultivation season carts are hard to procure. Most of the carting is done in the dry weather, from January to June. During the period of working of the saw mill, considerable quantities of timber have been carted from the forests to Russellkonda under departmental supervision. The mill requirements were about 180,000 cubic feet every year and it may be said fairly that this figure is the maximum amount of timber that could be delivered at the mill, whilst using the available carts of Ghumsur. The cartmen are generally Oriyas.

105. *Number of carts available in Ghumsur.*—The success of any large scale exploitation being dependent upon where, and to what extent a suitable means of transport is available, an enquiry has been made as to the number of carts in possession of each one of the villagers situated in Ghumsur. For convenience the figures are arranged below against each revenue firka ; the detailed figures for each village will be found in Appendix II. Zamindari tracts are excluded.

Taluk.	Firka.	Number of villages.	Number of carts available.	Taluk.	Firka.	Number of villages.	Number of carts available.
Ghumsur ..	Russellkonda ..	48	856	Surada ..	Surada ..	29	465
	Kullada ..	65	734		Surumoni ..	11	264
	Bellugunta ..	50	1,009	Agency ..	Pondakhol mutta ..	15	72
	Mojjagoda ..	34	432				
	Gerada ..	50	364				
	Jaganadprasad.	61	722		Total ..	443	6,364
	Ballipodaro ..	31	682				
	Buguda ..	49	764				

The majority of the villages considered are situated within five miles of a reserved forest. Some of the carts are owned by rich ryots who do not let them out for hire under any circumstances. Approximately three-fourths of the total number of carts or about 5,000 may be expected to be available for timber transport except in periods of agricultural activity.

Section 5.—Cost of Exploitation.

106. *Felling, logging and barking.*—The felling of the trees, cross cutting them into logs and the removal of bark are all included in one operation for purposes of payments. The cost is 6 pies per cubic foot irrespective of species

or locality and whether the timber is sound or unsound. Logs of large dimensions, exceeding 5 feet in girth, are usually rough squared by chiselling off the sapwood. The cost of rough squaring is 6 pies per cubic foot. These rates are the same as they were about ten years ago. Felling under these conditions is a paying piece of work, and attracts labour from all directions. Khonds and other axemen earn as much as 8 to 12 annas a day.

107. *Dragging.*—Timber is dragged by buffaloes from the stump site to collecting depots from which carting is possible, either in the forest, or outside. The cost of dragging in the plains varies from 3 to 6 pies per cubic foot and in the hills the cost is about one anna per cubic foot.

108. *Carting.*—The rates of cart-hire have risen greatly, by as much as 50 to 100 per cent, in recent years. The rates for the transport of ordinary goods are fixed by the Collector for the whole district excluding the Agency tracts. The rates in force in 1918 taken from Mr. Minchin's Working Plan are compared with the current rates :—

Nature of the road.	Rates in 1918. January to June.	Rates in 1918. July to December.	Current rates. January to June.	Current rates. July to December.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
On metalled roads per mile	0 1 3	0 1 9	0 2 6	0 2 9
On earth roads per mile	0 1 6	0 1 9	0 2 9	0 3 0

The rates fixed by the Collector are accepted as the basis for arriving at the rates per cubic foot to be paid for transporting timber and the calculation is made in the manner indicated in the following illustration.

Let the average cart-load be 16 cubic feet; distance from the forest to Russellkonda : 20 miles. Average cart-hire to be the maximum fixed by the Collector : Re. 0–3–0 per mile.

Cart-hire per cubic foot $\dfrac{\textit{Rate per mile} \times \textit{Distance in miles}}{\text{Load in cubic feet.}} : \dfrac{0\text{–}3\text{–}0 \times 20}{16} :$ 0 3 9

Add extra 3 pies per toll and 3 pies for river crossings 0 0 6

0 4 3

The rates of cart-hire actually paid by the Forest department for carting timber from the selection forests to the Russellkonda Saw Mill are given below :—

Range.	Reserve.	Year of exploitation.	Distance from forest to Russellkonda.	Rates of cart hire per cubic foot.
			MILES.	RS. A. P. RS. A. P.
Russellkonda	Baiballi	1925–27	16–18	0 3 0 to 0 4 0
Mojjagoda	Dhimirijoli ..	1920–23	20–22	0 3 0 to 0 3 4
	Rambha	1922–25	17–23	0 2 6 to 0 4 3
	Dharpangia ..	1927–29	16–19	0 3 3 to 0 4 0
Kukuluba	Chandragiri ..	1927–29	10–22	0 2 0 to 0 5 3
Bontha	Paichalia	1921–22	37	.. 0 5 0
	Brahmansai ..	1927–29	18–22	0 3 6 to 0 4 6
Buguda	Kriamba	1923–27	36	.. 0 5 6
Surada	Rogoda	1924–26	15–22	0 2 6 to 0 3 3

The cart-hire for transporting timber from Russellkonda to Berhampur, a distance of 52 miles, was 4 annas per cubic foot in 1918. The current rate is 6 annas per cubic foot showing an increase of 50 per cent.

109. *Summary of the costs of delivering timber on rail at Berhampur.*—The expenses, under present conditions, of extracting timber from the forest and

delivering it on rail at Berhampur is summarized below. An average lead of 20 miles from the forest to Russellkonda is assumed.

	Rs. A. P.
Felling, logging and barking per cubic foot.	0 0 6
Rough squaring	0 0 6
Dragging	0 1 0
Carting from forest to Russellkonda, 20 miles.	0 4 0
Carting from Russellkonda to Berhampur, 52 miles.	0 6 0
Loading charges	0 0 6
Contingent expenditure	0 0 6
Total per cubic foot ..	0 13 0

The cost of timber f.o.r. at Berhampur thus works out to 13 annas per cubic foot, making no allowance for supervision or overhead charges.

Section 6.—Past and Current Prices.

110. *Sales of mill sawn timber.*—Statement 1 gives the sales of mill sawn sal timber, by the Russellkonda Saw Mill during the period of its existence from April 1922 to June 1928. The figures are compiled from the annual audit reports and include the sales of small but negligible quantities of *Pterocarpus marsupium.* The last sale of the balance of stock was transacted by the Forest department. With the exception of some minor sales at Russellkonda, Vizagapatam and Calcutta, the prices realized are based on the rates quoted at Berhampur f.o.r. During the seven years 1922 to 1928 the total quantity sold annually increased steadily and reached a maximum of 87,960 cubic feet in 1927–28. But the average selling rate per cubic foot did not keep pace. The highest rate, Rs. 3–3–11 per cubic foot, was obtained in 1923–24. Since then, the rate shows a decline in every successive year to a minimum of Rs. 2–6–8 per cubic foot, in April to June 1928. The most noteworthy contract of the saw mill was the supply of 70,000 narrow gauge sleepers 5′ × 6″ × 4½″ to the Parlakimedi Railway at Rs. 2–6–6 per sleeper delivered at Berhampur f.o.r. This contract was accepted at a low price with a view to keeping the mill busy at all times when other work was not coming in. On closure of the saw mill in June 1928, the Forest department was concerned with the fulfilment of the sleeper contract and with the disposal of the balance of stock. Besides minor sales, 15,600 cubic feet of sal were sold at Russellkonda in one lot at Rs. 1–14–0 per cubic foot and 844 cubic feet of *Pterocarpus marsupium* at Rs. 1–2–3 per cubic foot. Such sales being necessitated by the winding up of the concern, the rates are not strictly comparable to what might have been obtained under ordinary conditions.

In the following statement, which shows the saw mill transactions, the average selling rate per cubic foot is compared with the cost of production. The last three years, 1926 to 1928, are of interest as illustrating the small margin of net profit which the saw mill was able to make. It should be noted that the cost of production is based on a nominal price paid for logs to the Forest department. This price was considerably below the prevailing market rate and until 1st October 1926 was as low as 4 annas per cubic foot delivered at Russellkonda and thereafter it maintained an average of 5 annas per cubic foot. The cost of production takes no account whatever of any charges incurred by the Forest department.

Statement 1.—Sales of mill sawn sal Timber.

Year.	Quantity sold.	Price realized.	Average selling rate per cubic foot.	Cost of production per cubic foot.	
	C. FT.	RS.	RS. A. P.	RS. A. P.	
1922–23	16,843	49,929	2 15 5	1 9 2	Excludes overheads and interest charges.
1923–24	41,232	1,33,703	3 3 11	1 6 0	
1924–25	47,078	1,41,695	3 0 2	1 2 10	
1925–26	42,871	1,17,568	1 11 10	1 5 7	
1926–27	82,018	2,15,095	2 10 0	2 8 8	Includes overheads and interest charges.
1927–28	87,960	2,28,363	2 9 6	2 7 10	
1928–29 April to June 1928.	25,977	62,821	2 6 8	2 5 7	
July to September 1928..	24,045	47,622	1 15 8	Sold by Forest department.	

111. *Sales of logs.*—During the last ten years, we have had very little experience of testing the local timber markets with sal logs of the best quality. The inception of Mr. Minchin's Working Plan was closely followed by the opening of the Russellkonda Saw Mill, and, until 1928, all the energies of the Forest Department were spent in supplying the saw mill with sal timber of millable quality. For logs delivered at Russellkonda, the saw mill paid to the Forest Department a mere nominal value of four annas per cubic foot. In October 1926, this price was raised to an average rate of five annas per cubic foot. It may be said that these prices sometimes hardly covered the cost of extraction and were undoubtedly below the prevailing market rates. After the closure of the saw mill, a certain number of millable sal logs remained in the forest, and outside, and these were sold to local contractors as follows :—

Year.	Locality.	Quantity.	Amount.	Rate per cubic foot.
		C.FT.	RS.	RS. A. P.
1928–29	Tarasingi	309	205	0 10 7
	Tiliki forest	1,975	1,432	0 11 7
1929–30	Tarasingi	3,500	1,750	0 8 0

On the other hand we have put on the market several lakhs of cubic feet of poor quality timber which went by the name of 'reject logs,' that is, logs discarded in the forest after selecting for the saw mill the straight, soundpieces of nine feet and over in length × 33 inches in girth under bark at the thin end. In 1920 to 1922 the Forest Department extracted and brought to its depot at Russellkonda large quantities of logs of various species in view of the opening of the saw mill. But the saw mill accepted only sal and *Pterocarpus marsupium*. The rejected logs were sold at Russellkonda as follows :—

Year.	Species.	Quantity.	Amount.	Rate per cubic foot.
		C.FT.	RS.	RS. A. P.
1922–23 ..	Terminalia tomentosa ..	18,960	9,480	0 8 0
	Adina cordifolia	26,411	11,555	0 7 0
	Mixed other species ..	26,411	9,367	0 5 7
	Total ..	71,782	30,402	0 6 9

There has not been any other sale of importance in the case of species other than sal.

Statement 2, gives the average rate per cubic foot obtained for 'reject sal timber' sold in the forest in the various reserves. The fellings were in the Selection Working Circle except in Tiliki, Galleri, Gogodo and Pippalaponka reserves where the fellings were in the Plains Sal Timber Working Circle. The price varies from one anna six pies to nine annas five pies per cubic foot. The variation in rates is considerable and is largely dependent on the distance of the forest from the nearest local market.

Statement 2.—*Sales of 'Reject sal Logs.'*

Rate per cubic foot in the forest.

Range.	Russellkonda.		Mojjagoda.			Kukuluba.	Bontha.			Buguda.	Surada.	
Reserve.	Baiballi.	Tiliki.	Rambha.	Dharpangia.	Galleri.	Chandragiri.	Brahmansai.	Paichalia.	Gogodo.	Kriamba.	Rogoda.	Pippalaponka.
	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.	A. P.
1922–23 ..	..	..	..	..	5 0	..	..	..	..	..	..	4 0
1923–24 ..	..	..	..	..	3 0	..	..	..	..	..	..	2 0
1924–25 ..	..	..	1 10	..	2 3	..	..	2 7	..	(a) 6 2	5 8	4 9
1925–26 ..	..	..	..	..	..	..	..	..	..	..	4 4	..
1926–27 ..	2 4	..	..	..	3 7	..	..	..	..	(a) 6 2	2 2	2 9
1927–28 ..	..	..	..	2 4	5 7	..	..	..	..	(a) 9 5	1 7	..
1928–29 ..	..	..	..	(b) 3 3	..	..	(b) 3 10	..	..	(a) 5 0	(c) 1 6	..
1929–30 ..	..	(b) 1 10	..	..	..	(b) 2 11	(b) 2 0	..	(b) 1 6	..	..	..

(*a*) The timber was carted to Konaipur, Sardapur, Berhampur or Moraipalli depots at a cost of Re. 0–1–6 per cubic foot and sold.

(*b*) The timber was dragged to the nearest cart-track at a cost of six pies per cubic foot.

(*c*) The timber sold up to 1928–29 belongs to the fellings of 1924–25. The steady decline in rates is due to the deterioration of timber.

112. *Sales of Plains Sal Timber Coupes Clear-fellings.*—Statement 3 gives the rate per acre realized by selling the plains sal timber coupes of Felling Series I and II. The rates do not stand a fair comparison for the following reasons. In 1919–20 the natural forest of Coupes I and II of both felling series was sold standing to contractors. Since then, a change in the methods of extraction was introduced in order to supply millable timber to the Russellkonda Saw mill. Coupes II and III of series I were clear-felled departmentally and useful timber was extracted and sent to the saw mill. The residue lying on the ground was then sold. Coupes IV and IX were sold with standing growth left after the departmental extraction of sal trees, 3′ 3″ in girth and above. In Coupes X and XI the whole natural forest including the mature trees was sold standing. In regard to Felling Series II, in all the Coupes II to XI, sal trees 3′ 3″ girth and above had been extracted departmentally in advance and the price realized is for the residual standing growth. The price per acre varies from Rs. 5 to 99 in Series I and from Rs. 20 to 71 in Series II. It may be noted that up to 1927–28, Felling Series II has fetched much better rates than Series I, owing to the proximity of the coupes to the nearest metalled road.

Statement 3—Sales of Plains Sal Timber Coupes—Clear-fellings.

	Rate per acre in rupees and annas.										
Year.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
Coupe No.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
	Kukuluba Range.						Bontha Range.			Mojjagoda Range.	
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
Felling Series I.	38 0	5 5	9 1	7 7	26 9	28 3	25 0	5 4	11 8	68 7	99 1
	Buguda Range.										
Felling Series II.	53 0	20 0	27 4	32 12	25 0	33 0	42 0	48 4	53 4	52 4	71 0

113. *Sales of Ravine Coupes Clear-fellings.*—Statement 4 gives the rate per acre obtained from the sales of ravine coupes in 1924–25 to 1929–30 in Mojjagoda range. No figures are quoted for Coupes I and II, as they were clear-felled departmentally. In the case of all these coupes, timber fit for the saw mill has been extracted previously and the residual standing growth alone was offered for sale. Owing to their remoteness, situation on hill slopes and mixed growth containing few sal trees per acre, there has always been difficulty in selling the ravine coupes. Departmental working was tried in 1920–21 and 1921–22 and given up as unremunerative business. In the following two years no contractor came forward and no coupes were worked. From 1924–25 up to date, coupes have been sold to contractors at rates ranging from Rs. 5 to 28 per acre. But the area that could be sold was until 1928–29 less than one-third of what was prescribed. The departmental extraction of the mature sal trees in advance was a mistake. Thereby the coupes were reduced to little or no value. It is feared that several ravine compartments have been affected in this manner and consequently difficulties will arise in allotting saleable coupes for the next ten years.

Statement 4—Sales of Ravine Coupes—Clear-fellings.

	Rate per acre in rupees and annas.					
Year.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
Coupe number.	III	IV	V	VI	VII	VIII
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
Mojjagoda Range.	5 0	12 0	14 0	12 0	28 3	26 0

114. *Sales of Plains Sal Pole Coupes—Coppice fellings.*—Statement 5 gives the average rate per acre obtained in each range for the plains sal pole coupes. No coupes were sold in Kukuluba and Pondakhol ranges. The

average rate for the five ranges has fluctuated during the last eleven years between Rs. 28 and 49 per acre. The lowest rate was Rs. 27–8–0 in 1919–20 and the highest Rs. 48–11–0 in 1925–26. One drawback in the lay-out of these coupes was the inclusion of a large proportion of unproductive broken ground and non-sal areas which depreciated the value of the coupes. This defect has been partly rectified by restockmapping the sal pole areas in detail. If prices are to improve, coupes should be laid out with judicious care so as to include only third quality sal forest, and no broken ground nor ground devoid of sal.

Statement 5—Sales of Plains Sal Pole Coupes—Coppice fellings.

Range.	Average rate per acre.										
	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
Russell-konda.	14 7	20 10	26 15	52 15	34 3	54 1	42 7	60 14	42 3	50 0	36 14
Mojjagoda.	..	..	..	..	11 8	18 0	55 7	41 0	43 7	17 6	40 0
Bontha.	12 0	..	..	..	16 0	61 0	46 0	38 0	45 0	56 0	66 0
Buguda.	35 15	41 3	31 0	43 9	42 8	41 3	45 11	29 10	27 4	20 14	32 10
Surada ..	28 8	36 5	26 11	28 14	33 10	33 8	44 15	51 10	38 7	25 11	86 3
*Average.	27 8	35 3	28 4	40 13	34 9	46 7	48 11	47 14	38 3	34 8	48 10

* The average is obtained by dividing the total amount realized from all series by the total area sold.

115. *Sales of fuel coupes—Coppice fellings.*—Statement 6 shows the selling rates of minor hill forest and scrub jungle fuel coupes. The demand for fuel is generally met from the sal pole coupes and where these do not exist, a limited demand exists for purely fuel coupes in Russellkonda, Bontha and Buguda ranges. The average price varies from Rs. 6 to 38 per acre in the minor hill forest and from Rs. 2 to 12 in the scrub jungle.

Statement 6—Sales of Fuel Coupes—Coppice fellings.

Range.	Average rate per acre.									
	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
Minor hill forest.										
Russell-konda.	37 8	12 0	38 0	24 0	17 0	11 4	15 10	6 5	24 9	20 2
Bontha ..	..	..	..	..	..	..	..	..	..	4 0
Buguda ..	..	..	..	..	..	..	..	..	..	5 8
Average.	37 8	12 0	38 0	24 0	17 0	11 4	15 10	6 5	24 9	14 11
Scrub jungle.										
Russell-konda.	2 5	4 1	6 4	6 13	12 4	8 11	10 0	4 14	4 2	3 11
Buguda ..	..	..	..	..	..	..	..	..	..	8 8
Average.	2 5	4 1	6 4	6 13	12 4	8 11	10 0	4 14	4 2	4 8

116. *Sales of bamboo coupes.*—Statement 7 shows the sales of bamboo coupes in the different ranges. The bamboo coupes are selected with natural features as boundaries and therefore include considerable areas which do not bear any bamboo. The demand for bamboos is purely local and the coupe is sold not per acre but as a whole. The total amount realized in each year affords a better indication of the local demand than the rate per acre. During the past eleven years, the gross sales have increased from Rs. 2,490 in 1919–20 to Rs. 6,031 in 1929–30.

Statement 7—Sales of Bamboo Coupes.

Range.	1919–20.		1920–21.		1921–22.		1922–23.		1923–24.	
	Area.	Amount.	Area.	Amount.	Area.	Amount.	Area.	Amount.	Area.	Amount.
	ACS.	RS.	ACS.	RS.	ACS.	RS.	ACS.	RS.	ACS.	RS.
Russellkonda	6,415	2,100	1,270	1,001	2,938	1,200	4 160	1,634	4,720	1,604
Mojjagoda	..	..	2,500	200	2,500	100	858	110	5,500	240
Kukuluba	..	..	..	..	..	..	..	..	..	..
Bontha	..	..	..	..	..	..	..	..	..	..
Buguda	..	..	29	648	..	..	960	400	725	300
Surada	800	390	1,400	885	1,400	815	1,250	730	2,625	2,005
Pondakhol	..	..	..	..	..	..	..	..	..	..
Total ..	7,215	2,490	5,199	2,734	6,838	2,115	7,228	2,874	13,570	4,149

Range.	1924–25.		1925–26.		1926–27.		1927–28.		1928–29.		1929–30.	
	Area.	Amount.	Area.	Amount.	Area.	Amount.	Area.	Amount.	Area.	Amount.	Area.	Amount.
	ACS.	RS.	ACS.	RS.	ACS.	RS.	ACS.	RS.	ACS.	RS.	ACS.	RS.
Russellkonda	6,135	1,900	3,503	300	3,158	2,578	3,399	1,589	4,075	1,190	5,240	2,521
Mojjagoda	2,500	262	2,215	225	2,757	342	3,440	365	2,263	290	3,220	355
Kukuluba	..	..	..	..	..	..	..	..	..	..	..	..
Bontha	..	..	..		946	451	1,200	711	830	120	914	80
Buguda	700	812	350	820	500	820	1,010	730	752	523	758	584
Surada	1,800	1,420	900	740	2,460	1,817	1,900	1,765	1,230	1,100	2,800	2,261
Pondakhol	..	..	..	..	..	..	..	..	..	..	778	230
Total	11,135	4,394	6,968	2,085	9,821	6,008	10,949	5,160	9,150	3,223	13,710	6,031

117. *Sales of thinnings.*—The produce resulting from thinnings of plains sal timber and ravine crops aged five years have generally been unsaleable. There are only two instances of sales (1) in Series I in 1926–27 when thinnings over 31 acres of Coupe II were sold for Rs. 31 and (2) in Series II in 1924–25 when 79 acres of Coupe I and II were sold for Rs. 84. Remoteness of coupes is an important factor in the sale of small material. Thinnings of pole coupes have fetched some small amounts in places where the coupes were in the neighbourhood of local villages. Statement 8 shows the rate per acre realized in each range. The rate varies from 2 to 59 annas per acre.

Statement 8—Sales of thinnings of Pole Coupes.

Year.	Russellkonda.		Mojjagoda.		Bontha.		Buguda.		Surada.	
	Age of crop.	Per acre.	Age of crop.	Per acre.	Age of crop.	Per acre.	Age of crop.	Per acre.	Age of crop.	Per acre.
		A. P.		A. P.		A. P.		A. P.		A. P.
1920–21 ..	14 17	59 0	..	..	14 17	30 3	..	..	..	..
1923–24 ..	10 16	43 8	..	..	..	..	..	..	..	..
1924 25 ..	8 14	30 1	..	..	..	..	11 13	15 0	..	..
1925–26 ..	7 11	13 3	..	..	6 12	2 0	6 11	3 2	..	..
1926–27 ..	5 7	12 11	..	..	..	..	8 9	16 4	..	..
1927–28	5 15	7 3	9 11	9 10	..	..	5	8 4	5	5 9
1928–29 ..	5 19	2 9	5	10 9	..	..	7 11	2 11	7 11	9 1
1929–30 ..	5 11	4 7	5	25 3	5	25 2	5 6	3 10	5 20	6 4

REMARKS.—Thinnings of some years were unsaleable. Rates obtained vary from 2 to 59 annas per acre. The produce was sold on an acre basis or on a rough estimate of the number of cart-loads of saplings and poles available.

118. *Sales of minor forest produce.*—The demand for minor forest produce is very limited. In 1920 the right to collect nux vomica over the whole of the Ganjam district reserves and unreserves, was sold to a contractor from Madras for Rs. 6,000 on a lease of three years. This contractor paid only one instalment of Rs. 2,000 and never attempted to collect any fruit. A lengthy correspondence ensued between him and the District Forest Officer which resulted in the cancellation of the contract. This sale may be ignored. In 1920–21 the minor produce excepting nux vomica and rela (*Cassia Fistula*) bark of Pondakhol range, was sold on a three-year lease for Rs. 1,500 at Rs. 500 per annum. Since then, there has not been any other sale except of rela bark. The minor produce is enjoyed freely by the Kondhs as a concession and under such circumstances its commercial possibilities are limited or even absent.

Statement 9—Sales of minor forest produce.

Year.	Name of produce.	Locality.	Amount.	
			RS.	
1920–21 ..	Minor produce except rela bark and nux vomica.	Pondakhol range.	1,500	On a three year lease, at Rs. 500 per annum.
1926–27 ..	Rela bark (*Cassia Fistula*) ..	Bontha range ..	1,000	
	Do. ..	Buguda range	800	
1929–30 ..	Rela bark (*Cassia Fistula*) ..	Russellkonda range.	135	

119. *Current prices of timber at Russellkonda market.*—As far as can be ascertained the rates at which the local contractors sell their timber at Russellkonda now, are given below. The rates are for rough squared timber of the more important species.

	Per cubic foot.		Per cubic foot
	RS. A. P.		RS. A. P.
Sal first class, 4′ and over in girth ..	1 0 0	*Pterocarpus marsupium* 4′ and over in girth.	1 0 0
Second class 3′ to 4′ in girth ..	0 12 0	*Adina cordifolia* 4′ and over in girth ..	0 12 0
Third class (poles) 2′ to 3′ in girth ..	0 6 0	*Terminalia tomentosa* 3′ 6″ and over in girth..	0 8 0

The popular length of logs is 12 feet to 18 feet. There is very little sawing at Russellkonda and if logs are sawn, the sawing charge is Re. 1 per cubic foot. The prices of timber at Surada are approximately the same as those at Russellkonda. As soon as the harvest season closes, the timber trade becomes active and this is during the three months of January to March.

CHAPTER IV.—STAFF AND LABOUR SUPPLY.

SECTION 1.—STAFF.

120. *Present staff.*—The District Forest office and Range establishment as it stood on March 31, 1930 is shown in the following statement. Berhampur range and Balliguda Agency which are outside Ghumsur are omitted.

Name of establishment.	Gazetted Officers.	Rangers.	Foresters.	Forest guards.	Forest watchers.	Clerks.	Peons.	Bungalow watchers.	Annual expenditure.
									RS.
District Forest Office.	1	..	..	..	..	10	4	..	19,528
Extra Assistant Conservator's Office.	1	..	..	..	..	1	1	..	8,064
Russellkonda range.	..	1	3	10	10	1	1	1	6,066
Mojjagoda Range ..	..	1	3	15	15	1	1	5	8,784
Kukuluba range ..	..	1	3	8	8	1	1	3	7,302
Bontha range ..	..	1	2	7	7	1	1	4	6,966
Buguda range ..	..	1	2	8	8	1	1	2	4,938
Surada range ..	..	1	2	10	10	1	1	2	5,604
Pondakhol range ..	..	1	..	8	8	1	1	1	5,766
Total ..	2	7	* 15	66	66	18	12	18	73,018

* *Note.*—The sanctioned number of foresters for Ghumsur is 20.

The total number of posts is 204 and the annual expenditure is Rs. 73,000. The District Forest Officer is usually a Deputy Conservator and he is assisted by an Extra Assistant Conservator stationed at Russellkonda whose primary business is to look after fire protection and forest offences. There are seven Range Officers with headquarters at Russellkonda, Tarasingi, Buguda, Surada and Gazilbadi. The Range Officers of Kukuluba, Bontha and Pondakhol draw an additional monthly allowance of Rs. 50 for being stationed in unhealthy tracts. The Range Officer, Mojjagoda, earns an additional 30 per cent of his salary by virtue of his holding charge of Chokkapad Reserve in the Agency. This allowance is subject to a maximum of Rs. 50 per month.

121. *Reduction in strength.*—Reduction in the present staff is possible in one or two directions. In view of the absence of any special works in Pondakhol range there is no justification for keeping a range officer there. No suggestion is made to abolish the range as a unit but the Surada Range Officer can hold additional charge of Pondakhol range and be allowed extra remuneration amounting to 30 per cent of his pay under the same arrangement that exists for Mojjagoda range. The sanctioned number of foresters for Ghumsur is 20. This appears to be in excess of the future requirements, which are dealt with in paragraph 408 of Part II. Fifteen foresters should prove to be adequate for the works contemplated in the present plan and they may be distributed as follows :—Russellkonda 2, Mojjagoda 4, Kukuluba 2, Bontha 2, Buguda 2, Surada 2, and Pondakhol 1.—The strength of forest guards and forest watchers can also be reduced. Detailed proposals are made in paragraph 408 of Part I.

Section 2.—Labour Supply.

122. *Labour.*—The Kondhs and Oriyas supply all the labour required for forest works. The Kondhs are a great asset to the Forest Department. In return for the free concessions enjoyed by them they are under certain obligations to supply labour when needed. Where Kondhs are scarce or absent, Oriya labour is obtainable but only with difficulty. During the sowing and harvesting months, June–July and December–January, labour is hard to procure. A certain amount of Oriya labour, estimated to be about 500 coolies is taken away annually from Ghumsur by private emigration agencies and shipped from Gopalpur to Assam or Rangoon. It is gratifying to note that Kondh labour resists successfully the vigorous pursuasions of these agents. Occasionally forest offenders bolt to Rangoon before their cases come up for trial.

123. *Wages.*—Felling and fire protection works are done on contract rates; other works on daily labour. In 1918 the daily wages were 3 annas for men, 2 annas for women and $1\frac{1}{2}$ annas for children. During 1919, the rates rose owing to a severe famine, and Mr. Minchin in his working plan suggested that the higher rates would be maintained. This has been proved to be the case and the present rates for Kondh labour are 4 annas for men, 3 annas for women and 2 annas for children. The Kondhs generally accept these rates on account of their obligations to the Forest Department but the amount of work turned out by them is poor. Oriya labour sometimes cannot be had for less than 5 annas a day for male coolies and the tendency is for the general rate to rise to this figure. Public Works and Local Fund contractors have to pay for their works 6 annas for men and 4 annas for women. Felling is paid for at 6 pies per cubic foot and this is perhaps the most attractive work, as it pays the labour better than any other forest work.

CHAPTER V.—PAST SYSTEMS OF MANAGEMENT.

Section 1.—General History of the Forest.

124. *Early history.*—* " In early times it appears that the plains of Ghumsur were marshes, extending as far as the line of low hills on the coast. The inhabitants of the coast were our present hill tribes, the Kondhs and the Savaras.

" The Ghumsur forests are situated in what were the Ghumsur and Surada Zamindari States, at the time of the occupation of India by the British. The first expedition (of many expeditions), against the Ghumsur Rajas, was by French troops led by the Conte de Bussy in 1757. He speaks of Ghumsur as 'impenetrable' and 'one of the hottest regions of Hindustan.' He had difficulties with the bamboos which, it appears, covered densely the plain country. In 1766, the British, who had ousted the French, settled down in Ganjam town, at the mouth of the Rushikulya, to trade and to exact tribute. There followed a succession of inconclusive expeditions against the Ghumsur and the other zamindari who seem to have been tiresome about their remittances.

125. "*Annexation of Ghumsur.*—In 1814 Danunjaya Bhunj, Zamindar of Ghumsur, a hardened character, murdered his mother. In the old fort, within the present Kullada Reserve, he also habitually 'immured prisoners who have excited his vengeance, and unfortunate women, the victims of his lust, starving them to death by slow degrees. Some he confined in stocks, whilst he bent the hands of others with heavy stones or tied them to stakes in the sun, and left them to a lingering death.' As moreover he was unpunctual with his remittances, and as he resisted the process of the Criminal Court in connexion with one of his murders, his zamindari was declared to be forfeited to Government. He was captured, by an expedition sent up for the purpose, tried for his life, and acquitted. (The witnesses against him, being relatives of the victims, were for that reason considered to be 'prejudiced.') The Madras Government reinstated him ultimately. As might be expected, another expedition against him became necessary. The expedition started in 1832 and was led by Mr. Russell, founder of Russellkonda town and Commissioner of the Board of Revenue. It need hardly be said therefore that this expedition met with success.

Ghumsur and the adjoining Surada zamindaris were annexed in 1836. The paiks, military dependents of the Ghumsur family, were given duties to perform and were settled in service-inam lands."

126. *Mr. Russell's account of the forests.*—Mr. Russell wrote approvingly of the forests. The bamboo covered the low country still, it seems, and the 'dammer tree' (sal) grew everywhere else. "It is worthy of remark", he wrote, "that this tree, which in some places grows to a great size, has very small branches and few leaves, and that the ground beneath is almost everywhere free from undergrowth and brambles." So we may conclude that forest fires occurred in those days too."

127. *Detailed history from* 1850 *to* 1930.—A detailed history from 1850 up to 1930 will be found in Appendix III. The history up to 1901 is prepared by Mr. S. Cox; from 1901 to 1912 by Mr. H. C. Bennett, from 1913 to 1918 by Mr. A. F. Minchin and from 1919 to 1930 by the present Working Plans Officer.

SECTION 2.—PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS—1851–1919.

128. *Policy of reckless exploitation* 1851–1900.—* "Before 1851 nothing very definite seems to have been written regarding the forests. Between 1851 and 1863 the authorities were content with turning the forests to profit by leasing them to sleeper contractors, and in 1861 a 'Forest tax' was imposed. In 1863 a report shows that the forests had already been denuded of good large timber. Closure to felling was 'attempted' on a small area in 1866. Mr. Gamble reported on the district in 1884, and laid the foundations of proper management. Up to 1900 however extraction of sleepers was permitted, unhampered by sylvicultural rules, and immediate profit was the main consideration. Up to 1900 (and indeed onwards until 1907 or thereabouts) the greater part of the forest appears to have been burnt over during most hot weathers. Under the 'permit system' the forests had been for many years at the mercy of timber and fuel dealers. The condition of the forest about 1900 when Messrs. S. Cox and F. Cowley Brown began the preparation of working plans for the forests was what might be expected. The hill forests being least accessible had suffered less than the plains forests."

The vivid description given by Mr. H. C. Bennett may be quoted in this connexion. "For about 50 years after the Ganjam Forests came under administration, they were subjected to an intermittent series of exploitation crusades as the demands of the market or the uncontrolled zeal of revenue and departmental officers dictated. A succession of heavy annual fellings aggravated by the importunities of sleeper contractors would be followed by years of inaction during which usually no attempts were made to rectify the previous reckless policy by cultural or protective operations. It has, however, to be borne in mind that during this period the administration was busily engaged in reservation, selection, demarcation, road making and rest house construction. During the period a large and illegitimate revenue was obtained from the forests and very little expenditure was incurred on the necessary improvement and protective measures. The capital was encroached upon and the value of the property has deteriorated. The forests have been managed with an eye to quick financial results and not under sound sylvicultural principles. The aim of future administration must therefore be to restore the property to its normal condition and render it capable of a regular and sustained yield. To achieve this end, revenue on a large scale must be foregone for many years to come."

129. *Organization and improvement,* 1901–1919.—In 1901 systematic fire protection was introduced for the first time in the Ghumsur forests. Felling of large timber was discontinued and only dead wood was extracted. The first working plans prepared by Messrs. S. Cox and F. Cowley Brown were introduced in 1903 to 1905. Mr. Cox's plan covered the Mojjagoda (the present Russellkonda and Mojjagoda) and Kukuluba (the present Kukuluba and Bontha) ranges. Mr. Cowley Brown's Plan extended to the Buguda and Surada ranges. * "Their prescriptions can be summarized as follows: Termination of the 'permit system', demarcation of plains sal areas, introduction of special fire protection and exclusion of grazing in the demarcated plains sal blocks. Closure

of the forests generally, for a period of rest. During this period cautious improvement fellings were to be done in the plains sal blocks, nominally in accordance with certain rules for the Dehra Dun forests. (These rules, intended for North Indian conditions, presuppose the frost danger; and also that sal regeneration is 'shade bearing.') Actually the fellings were limited to the removal of dead and dying trees. In the inferior sal areas of the plains, coppice coupes were to be introduced on a 30-year rotation basis; and working of small bamboo coupes on a 5-year cycle. Hill forests were to be closed to working; only 20 large trees per annum were to be extracted from the Rambha hills. Regular maps were to be prepared by the Survey of India; and such matters as staff, departmental buildings, and communications were to be attended to. All these things have been done."

In 1913 the period of Mr. Cox's Plan came to an end. A new and detailed working plan was felt to be necessary. In order to carry on the works in the meantime an interim plan was drawn up by Mr. A. F. Minchin in 1915 embodying the prescriptions of the two previous plans. At the same time he undertook the task of compiling the current working plan besides his normal duties as District Forest Officer. The preparation of the plan took some four years and odd and working under it started in April 1919.

130. *Officers in charge.*—The officers who held charge of the Ghumsur Forests from 1861 to 1919 are given below. Up to 1883, the officers were from time to time called Overseer in charge of Ghumsur Forests, Ranger in charge of Ghumsur and Surada Ranges and Sub-Assistant Conservator of Forests. In 1883 the Forest and Jungle Conservancy Departments were amalgamated, and Mr. A. W. Lushington the first trained officer was appointed. In 1884 the officer in charge was styled District Forest Officer, Ganjam. The headquarters were originally at Russellkonda and thence were shifted to Chatrapur in 1889. The officers who held charge were :—

(1) Mr. John Brown, from 1861 to March 1865.

(2) Mr. Gniezlar in 1865.

(3) Mr. T. G. F. Macally, from June 1865 to 25th September 1878 (died on this date).

(4) Mr. E. Dampier, from 2nd December 1878 to 1883.

(5) Mr. A. W. Lushington, from December 1883 to 10th May 1887.

(6) Mr. C. L. Toussaint, from 24th June 1887 to 1st December 1887.

(7) Mr. A. W. Lushington, from 1st December 1887 to 18th May 1889 and 3rd July 1889 to 6th November 1890.

(8) Mr. J. S. Battie, from 7th November 1890 to 25th April 1895.

(9) Mr. S. Cox, from 26th April 1895 to 26th July 1895.

(10) Mr. J. S. Battie, from 27th July 1895 to 24th August 1895.

(11) Mr. R. McIntosh, from 25th August 1895 to 29th June 1896.

(12) Mr. J. L. M. O'Leary, from 7th July 1896 to March 1897.

(13) Mr. R. McIntosh, from 2nd March 1897 to 17th June 1897.

(14) Mr. J. L. M. O'Leary, from 18th June 1897 to 17th August 1898.

(15) Mr. C. E. C. Fischer, from 18th August 1898 to 16th April 1899, 18th July 1899 to 23rd December 1901 and 17th February 1902 to 6th January 1905.

(16) Mr. S. Cox, from 7th January 1905 to 24th July 1907.

(17) Mr. H. C. Bennett, from 25th July 1907 to 5th May 1909.

(18) Mr. T. A. Whitehead, from 6th May 1909 to 7th November 1909.

(19) Mr. H. C. Bennett, from 8th November 1909 to 25th November 1913.

(20) Mr. A. A. F. Minchin, from 26th November 1913 to 15th May 1915, 24th June 1915 to 15th June 1916, 4th August 1916 to 18th September 1917 and 21st October 1917 to 31st March 1919 (continued).

Section 3—Past Systems of Management and their Results—April 1919 to March 1930.

131. *General.*—The period now to be described is that of the introduction and application of Mr. Minchin's Working Plan. In March 1920, the working plan was completed and subsequently sanctioned in G.O. Ms. No. 2257, Development, dated 7th December 1921. But its prescriptions were treated as approved and began to be applied from April 1919. The management of the forests during the last decade was so intimately connected with the Russellkonda Saw Mill that it is desirable at the outset to place on record some of the facts regarding the mill and its working.

A. *The Russellkonda Saw Mill.*

132. *Reasons for erecting the Russellkonda Saw Mill.*—For some time past, the Ganjam District Board had been encountering difficulties in obtaining sawn timber for construction. In 1917 they propounded a scheme for erecting a saw mill at Russellkonda and submitted it for the approval of Government. Mr. Minchin's Working Plan for the Ghumsur Forests was then under preparation. The general condition of the forests, the available timber resources and the possibilities of working them were duly considered. It was decided that it would be preferable for the Forest Department to erect and manage a saw mill rather than for the district board to undertake a business which would be entirely dependent for the supplies of raw material on the State forests. It was also recognized that some method of timber conversion would be necessary for the proper working of the Ghumsur forests under the prescriptions of the new working plan. The chief arguments then advanced for erecting a saw mill may be summarized as follows :—

(1) Insufficient local demand to absorb the annual output of timber.
(2) Heavy cost of delivering timber in the log at the market.
(3) Impossibility of introducing hand-sawing on a sufficient scale.
(4) Desirability of finding an outside market for miscellaneous timbers.
(5) Impossibility of improving the value of the forests until the old stock was removed.

The saw mill as a profitable undertaking was also considered. It was expected that about 200,000 cubic feet of timber in the log could be extracted from the forests annually and converted into 100,000 cubic feet of sawn scantlings ; and it was anticipated that by selling the outturn, namely, 66,500 cubic feet of sal and 33,500 cubic feet of miscellaneous timber at Rs. 2–4–0 per cubic foot and Rs. 1–10–0 per cubic foot respectively, a profit of Rs. 56,359 could be made which represented an interest on the capital of 24 per cent.

Government accorded their sanction to the scheme in their Memorandum Revenue (Special) No. 1732-1/19-4, dated 3rd October 1919. The saw mill was erected in the years 1920 to 1922 at a cost of Rs. 3,53,702. The detailed management of the working of the mill and the marketing of the produce were entrusted to Messrs. Parry and Company.

133. *Sawing and its effect on log supplies.*—The mill began regular sawing from 1st April 1922. The Forest Department hoped to be able to pass all the timber they felled through the mill and find ready purchasers for the sawn scantlings. In view of this and in advance of the opening of the mill 300,912 cubic feet of sal logs and 56,353 cubic feet of *Terminalia tomentosa, Adina cordifolia, Pterocarpus marsupium* and other miscellaneous species were collected and stored at Russellkonda in 1920–21 and 1921–22. The saw mill, however, immediately after commencement decided to concentrate on one class of timber, namely sal, in order to establish its market first and summarily rejected all other species. From the sal logs, the mill exercised a further selection of the straight logs free from unsoundness and rejected the rest. Thus from the very inception of the saw mill, two of the objects with which it was started had to be thrown overboard, namely, (1) finding a market for miscellaneous timber and (2) finding a market for sal that was defective or unsound in the log.

The following statement has been compiled from the annual audit reports, to illustrate the main features in the working of the saw mill from 1st April 1922 to 30th June 1928 when it was finally closed under the orders of Government. It should be noted that the accounts of the mill were kept on a commercial basis :—

Statement showing logs worked, production, sales and profit or loss of the Russellkonda Saw Mill from April 1922 *to June* 1928.

	Logs worked.		Production.					Sales.			
					Cost of production per cubic foot.						
Year.	Quantity.	Value paid to Forest department and rate per cubic foot.	Output.	Wastage in conversion.	Cost of timber and sawing charges.	Over-heads of the mill.	Total.	Quantity.	Amount.	Average selling rate per cubic foot.	Profit or loss.
	C.FT.	RS.	C.FT.	PER CENT.	RS. A. P.	RS. A. P.	RS. A. P.	C.FT.	RS.	RS. A. P.	RS.
1922–23.	126,571	31,643 @0 4 0	41,862	70	1 9 2·4	..	1 9 2·4	16,843	49,929	2 15 5·1	—* 8,311
1923–24.	158,085	39,521 @0 4 0	52,935	67	1 6 0·459	..	1 6 0·459	41,232	1,33,703	3 3 10·6	—* 6,059
1924–25.	149,064	37,263 @0 4 0	56,411	62	1 2 10	..	1 2 10	47,078	1,41,695	3 0 2	+* 1,895
1925–26.	70,067	17,517 @0 4 0	26,628	62	1 5 7	..	1 5 7	42,871	11,758	2 11 10	—* 895
1926–27.	188,668	51,670 @0 4 4·58	77,629	59	1 1 0·24	1 7 7·73	2 8 7·97	82,018	2,15,095	2 9 11·61	+ † 8,389
1927–28.	206,701	64,259 @0 4 11·6	64,259	58	1 1 9	1 6 1	2 7 10	87,960	2,28,363	2 9 6·47	+ † 26,174
Quarter from April to June 1928.	70,815	22,434 @0 5 1	27,613	61	1 1 11	1 3 8	2 5 7	25,977	62,821	2 6 8	+ † 18,755
Total.	969,971	2,64,307	347,337	..	..	..	..	343,979	8,43,364	..	..

NOTE.—The balance of stock when the saw mill closed was 23,982 cubic feet of sawn timber and 7,441 cubic feet of logs.

* Interest on capital is not charged. It works out to Rs. 96,259 up to the end of 1925-26. If this interest is charged the loss on the concern for the year ending 1925–26 would be Rs 97,154.

† Interest on capital is charged.

The mill worked for six years and a quarter. There was a temporary closure for about seven months in 1925–26 owing to the heavy undisposed stock of cut timber on hand. The average intake of the mill was about 15,000 cubic feet of logs per month or 180,000 cubic feet per year. The total quantity of sal logs worked by the mill during the whole period amounts to 969,971 cubic feet. The Forest department was bound to maintain regular supplies of logs to the mill, delivered at the mill yard. As the mill experienced heavy wastage in conversion, its standard of selecting the sal logs was raised year after year. In order to meet the requirements of the mill a vast amount of illegitimate fellings took place particularly in the years 1926 to 1928.

134. *Prices of logs paid by the mill to the Forest department.*—The price for logs paid by the mill to the Forest department was purely a nominal price to cover the cost of fellings, logging and carting timber to Russellkonda. Up to 1st October 1926 the rate was 4 annas per cubic foot and thereafter the average rate was raised to about 5 annas per cubic foot. It should be noted that the prevailing market rate for the same quality logs was about 12 annas to Re. 1 per cubic foot. Up to 1926–27 the Forest department was able to keep the cost of extraction within about 4 annas per cubic foot. But in 1927–28, the last year of supply, the cost of delivering timber at the mill amounted to about 6 annas per cubic foot owing to the long leads to the felling areas. Timber was thus delivered at a net loss of one anna per cubic foot excluding all overhead charges.

135. *Percentage of outturn.*—In the first year of sawing, a heavy wastage of 70 per cent was experienced in converting the sal logs into sawn scantlings. The wastage was attributed to the widespread prevalence of unsoundness in the Gumsur sal, the extent of which was said to be unknown prior to the large scale exploitation and sawing. (Mr. Minchin's Plan definitely stated that a large part of the mature crop was unsound and one of the primary reasons for promoting the saw mill was to convert the unsound logs into saleable scantlings). However, by a careful selection of the straight sal logs free from unsoundness, the percentage of wastage was gradually reduced to 58 resulting in an outturn of 42 per cent, the highest figures which the mill was able to obtain.

136. *Total production.*—The saw mill produced a total quantity of 347,337 cubic feet. The cost of production given in the statement for the first four

years covers only the cost of timber and the sawing charges. Overhead charges of the mill are shown against the last two years and a quarter. The lowest cost of production is Rs. 2–7–10 per cubic foot in 1927–28 which is also the year of the lowest percentage of wastage. It is interesting to observe that in that year the mill showed the largest profits in spite of the comparatively low selling rate.

137. *Sales.*—When the mill commenced work, there was practically no market for sawn Ganjam sal and such a market had to be created amidst conditions of severe trade depression. The mill looked to Vizagapatam and Calcutta as its chief markets. Neither of these fulfilled its promise. Sales were pushed to some extent at Vizagapatam through the agents Messrs. Gordon Woodroffe & Co. But the Calcutta market was most disappointing.

Some consignments were sent to Calcutta in 1922. In April 1923 there was a stock of 2,365 cubic feet out of which only 1,249 cubic feet could be sold in the next two years. Trial consignments sent to Madras did not meet with success. The mill had therefore to be content with its sales within Ganjam and Vizagapatam districts. The three important markets supplied by the mill appear to have been Chicacole, Vizianagram and Vizagapatam. The average selling rate reached its maximum of Rs. 3–3–10·6 per cubic foot in 1923–24 which was the second year of working. Since then there was a steady decline to Rs. 2–6–8 in April to June 1928. The markets as a rule showed no signs of improvement. Sawn stocks accumulated to 45,866 cubic feet at the end of March 1925. This necessitated a temporary closure of the mill for about seven months commencing from April 1925 in order to clear the stocks. The most noteworthy contract held by the mill was the supply of about 70,000 narrow-gauge sleepers $5' \times 6'' \times 4\frac{1}{2}''$ to the Parlakimedi railway at Rs. 2–6–6 per sleeper delivered at Berhampur, f.o.r. The supplies were made in 1927 and 1928. The contract was accepted at a low price with a view to keeping the mill busy at all times when other work was not coming in. The experience of the mill was that it did not pay to cut broad-gauge and other sleepers at the prices that were offered for them. Beams, planks and scantlings paid much better.

138. *Profit and loss.*—In the early years of working, the question of charging the mill with interest on the capital was under consideration. The profit and loss up to 1925–26 do not take into account the interest on capital. During the first four years, the mill showed only once, a small profit of Rs. 1,895 in 1924–25. The interest on the capital for these four years amounted to Rs. 96,259. If the interest charges are taken into account the total loss up to the year ending 1925–26 amounts to Rs. 97,154. In 1926–27, the results of working showed a profit, for the first time, of Rs. 8,389 after allowing the interest charges. In 1927–28 the profit increased to Rs. 26,174. This profit does not represent the true state of affairs because it is based on an average log cost of As. 4–11·6 per cubic foot paid by the mill to the Forest department. The actual direct cost of log production to the Forest department in 1927–28 including felling, logging, carting, etc., but excluding overheads of all kinds was about 6 annas per cubic foot. Thus if the actual cost had been charged to the mill, the profit in 1927–28 would have been reduced to Rs. 12,674. The overheads on log production by the Forest department is estimated to be about 3 annas per cubic foot. If these were also charged the profit of Rs. 26,174 in 1927–28 would have been converted into a loss of Rs. 26,082.

139. *Summary.*—The Forest department supplied the saw mill with a total quantity of 969,971 cubic feet of the best sal timber available in the Gumsur forests. The quantity supplied in each year was not the same as the quantity cut up by the mill, but it may be taken to be approximately the same. The Forest department was bound to keep up regular supplies and to ensure that the log stocks at the mill depot did not fall short of three months intake, or 45,000 cubic feet. In order to fulfill this undertaking, a considerable strain had to be borne by the whole district staff. The mill supplies engaged the first attention of everybody concerned. All other considerations including silviculture, forest protection and finance were subordinated to the working

of the saw mill. A vast amount of timber that should not legitimately have been felled was taken out of the forests under a system of fellings described as 'Mill fellings.' Towards the close of the operations it became practically impossible to find timber of the sort that the mill required, anywhere within a radius of 20 miles of Russellkonda, and even if timber had been found beyond, it would have been impossible to extract it without positive loss on every cubic foot. To keep the mill adequately supplied, the prescriptions of the working plan were neglected to an alarming extent. For these reasons the closure of the mill was inevitable. When the mill closed, the Forest department became faced with the problem of disposing of about 3½ lakhs cubic feet of rejected timber that had accumulated all over the forests in consequence of the 'Mill fellings.'

During the whole period of its working the saw mill had to pass through severe trade depression. Its markets were restricted to practically two districts. The mill was unable to fulfill the several objects for which it was promoted. As a profitable concern it was a failure. Nevertheless it established a reputation for Ganjam sal. This is perhaps the only useful service that it was able to render to the Forest department.

B. Plains Sal Timber Working Circle.

140. *General.*—Under Mr. Minchin's Working Plan the Plains Sal Timber Working Circle was to be worked under a combination of main and subsidiary fellings. The main or clear-fellings were to take place in Periodic Block I. In Periodic Blocks II, III and IV, subsidiary fellings were to be carried out for the purpose of removing mature trees, and in the course of this operation certain improvement fellings were also prescribed.

141. *Main fellings.*—The working plan prescribed annual clear-fellings of about 123 acres in Felling Series I and 40 acres in Felling Series II commencing from 1919–20. The following table shows the coupes worked in the two felling series :—

		Felling Series I.				Felling Series II.			
Year.	Coupe.	Range.	Reserve.	Area.		Range.	Reserve.	Sold.	Area by re-survey.
				Sold.	By re-survey.				
				ACS.	ACS.			ACS.	ACS.
1919–20.	I	Kukuluba.	Chandragiri.	25	28	Buguda ..	Kurcholi.	41	(a) 31 (b) 5 (c) 1 37
1920–21.	II	Do.	Do.	230	(a) 150 (b) 80 230	Do. ..	Do. Kriamba.	38 ..	(a) 24 (b) 15 (c) 3 42
1921–22.	III	Do.	Do.	146	(a) 62 (b) 6 (c) 24 (d) 3 (e) 69 164	Do. ..	Do.	40	46
1922–23.	IV	Do.	Do.	142	(a) 54 (b) 62 (c) 17 (d) 20 153	Do. ..	Do.	40	(a) 8 (b) 2 (c) 3 (d) 2 (e) 11 (f) 3 (g) 10 (h) 8 47
1923–24.	V	Do.	Do.	134	(a) 88 (b) 11 (c) 17 (d) 20 (e) 7 143	Do. ..	Do.	29	32

Year.	Coupe.	Felling Series I. Range.	Reserve.	Area. Sold.	Area. By re-survey.	Felling Series II. Range.	Reserve.	Sold.	Area by re-survey.
				ACS.	ACS.			ACS.	ACS.
1924–25.	VI	Kukuluba.	Chandragiri.	146	(a) 82 (b) 68 150	Buguda.	Kriamba.	55	54
1925–26.	VII	Bontha ..	Brahmansai.	128	(a) 47 (b) 81 128	Do. ..	Do.	38	(a) 13 (b) 16 (c) 11 40
1926–27.	VIII	Do. ..	Do.	128	159	Do. ..	Do.	40	(a) 21 (b) 2 (c) 12 35
1927–28.	IX	Do. ..	Do.	133	128	Do. ..	Do.	44	(a) 1 (b) 31 (c) 3 (d) 10 (e) 1 46
1928–29.	X	Mojjagoda.	Galleri ..	138	*138	Do. ..	Do.	39	(a) 11 (b) 1 (c) 6 (d) 19 37
1929–30.	XI	Do.	Do. ..	134	(a) * 46 (b) 88 134	Do. ..	Do.	37	(a) 22 (b) 10 32
			Total ..	1,484	1,555			441	448

* Computed from Range Officer's original survey sketch. Coupes were not resurveyed.

The coupes were in most cases wrongly located on the Control Maps. Consequently resurvey was necessary and it brought to light considerable differences in area. In one instance the difference is as much as 31 acres. The programme of fellings has generally been adhered to. In 1928–29, Coupe X prescribed in Gogodo and Ambazora reserves had to be abandoned owing to its remote situation and an accessible area in Galleri reserve was worked instead. In 1929–30, the same principle was adopted. Of the 15 coupes allotted for clear-fellings in Series I, four will have to be disregarded for some years to come. In the allotment of compartments to coupes, the distinction between relatively mature and young woods had been kept too minutely to be of practical value. In consequence, the annual coupes became split up into several small divisions situated widely apart and involved unnecessarily scattered working whilst compact areas might have been chosen with advantage. In the first year of working, the whole natural forest of the coupes of both series were sold standing to contractors. Since then the mode of executing the fellings has been partly departmental and partly by the agency of contractors. This was necessitated by the obligation of the Forest department to supply useful timber to the Russellkonda Saw Mill. The departmental extraction of mature trees was carried out in advance of clear-felling by contractors. Until 1922–23 the two operations were done in the same year but this was found to be unsatisfactory, owing to the fact that there was neither time nor labour for both agencies to complete their work efficiently. Therefore the extraction of mill timber was taken up one year ahead of clear-fellings. Sometimes the needs of the saw mill dictated fellings even two years ahead of their due time. All such fellings were carried out in contravention of the prescriptions of the plan and without proper sanction. On the closure of the saw mill in 1928, departmental extraction ceased and clear-fellings were reverted to, through the agency of contractors. Experience shows that the latter method is satisfactory and may be pursued in the future. Mr. Minchin prescribed that clear-fellings should be completed

by the 15th of February in order to prepare the ground for regeneration operations. In certain years the fellings were considerably delayed and consequently the young crops have not had the early start that should have been possible.

142. *Subsidiary fellings.*—If the main fellings were to some extent affected in the interest of the saw mill, the subsidiary fellings were completely subordinated to the saw mill's needs. Mr. Minchin's Working Plan prescribed subsidiary fellings to consist of (*a*) extraction of mature trees and (*b*) improvement fellings. Each of these operations is dealt with separately below. The subsidiary fellings were to take place over about 489 acres every year in Periodic Blocks II, III and IV. In Periodic Block II, mature sal trees of 4′ 6″ in girth and above were to be extracted and improvement fellings carried out merely to give elbow room to the crowns of promising sal trees ; the unsound sal trees were also to be removed. To expose to the light the existing sal advance growth was not an object of the operation. In Periodic Blocks III and IV, the subsidiary fellings were to be similar with the difference that the exploitable girth of mature trees was fixed at 4′ 3″ and it was desired to let the advance growth progress into the pole stage. In addition to the above, there was a further operation consisting in the cutting back of badly shaped sal saplings.

(*a*) *Extraction of mature trees.*—Instead of the work prescribed above the extraction of mature trees was done to suit the mill requirements and the area prescribed for working fell further into arrears year after year. At the end of 1925–26, the arrears amounted to 1,134 acres in Mojjagoda range. No necessity was felt for clearing up the arrears because the saw mill received sufficient supplies from the Selection Working Circle. In 1926–27 fellings were extended to the blocks of Russellkonda range that were prescribed for 1933–34 and 1934–35 because it was convenient to take out the timber from there. In 1927–28 a crisis came. There was a great shortage of logs in the saw mill. Consequently, mature trees were extracted from the sal blocks of Bontha range prescribed for 1930–31 and 1931–32 and from the sal blocks of Russellkonda range prescribed for 1932–33. Until the closure of the saw mill in June 1928, fellings from Periodic Blocks II, III and IV were carried on in an indiscriminate manner as the demands of the saw mill dictated. The consequence is that the forest has, as already pointed out above, been overfelled in order to keep the saw mill adequately supplied.

(*b*) *Improvement fellings.*—Improvement fellings were attempted unsuccessfully for five years and then were stopped under the orders of the Chief Conservator. It was found impossible to keep pace with the working plan prescriptions. The areas in which the improvement fellings were undertaken in each year were as follows :—

Year.	Felling Series I.				Felling Series II.			
	Range.	Reserve.	Area.	Price realized per acre.	Range.	Reserve.	Area.	Price realized per acre.
			ACS.	RS. A.			ACS.	RS. A.
1919–20 ..	Mojjagoda.	Galleri ..	69	17 1	Surada ..	Pippala-ponka.	116	5 0
1920–21 ..	Do.	Do. ..	140	25 14	Do. ..	Do.	134	15 0
1921–22 ..	Do.	Do. ..	108	22 4	Do. ..	Do.	124	14 4
1922–23 ..	Do.	Do. ..	127	16 9	Do.	Do.	136	28 0
1923–24 ..	Do.	Do. ..	202	15 0	Do. ..	Do.	122	35 8

Arrears were conspicuous in Felling Series I where at the end of 1923–24 they amounted to 1,140 acres. The improvement fellings were carried out through the agency of contractors. Departmental working was not adopted owing to the doubtful prospect of selling the felled material. The trees for retention were usually marked and the rest of the growth was sold standing to a contractor. In practice there was a tendency to do the fellings rather heavily. First, the mature trees 4′ 6′ in girth and over were extracted and this accounted for the removal of a good part of the upper story. In the immature crop left subsequently for improvement fellings, there was a large proportion of unsound trees to be removed. At the same time there were not many sound straight trees with good crowns, available for retention, which were capable

of responding to freeing. Consequently the fellings were unduly heavy and went beyond the intentions of the working plan. There was the danger of letting the advance growth reach the pole stage at the time of final fellings which were to take place 15 years hence. This was realized in 1923–24 and an attempt was made to lighten the fellings by marking the trees destined for extraction, but no satisfactory results were obtained. In April 1924 the Chief Conservator ordered that the improvement fellings should be given up. Looking at the improvement felled areas to-day, it is observed that large blanks have been created and that in several places the advance growth has undesirably grown to the sapling stage. In some blocks particularly of Surada range the areas treated under this improvement felling system present the appearance of a coppice with standards coupe. When such areas are clear-felled, the resulting crop would spring largely from coppice instead of from cut-back switch growth. Further, the immature trees that were retained have not shown sufficient response to the freeing. Epicormic branches still persist and the crowns of trees continue to remain stag-headed. During the next ten years it will be preferable to concentrate the operations in the annual clear-felling coupe which is being selected in as compact an area as possible in the most accessible locality. The only improvement that is contemplated in the forests of Periodic Blocks II, III and IV is climber-cutting.

143. *Regeneration.*—The method of regeneration evolved by Mr. Minchin has produced an amazing degree of success during the past eleven years, which well justifies its continuance in the future. The type of regeneration that it is necessary to have on the ground in order to produce a satisfactory crop is established regeneration or "advance growth" in the "switch" stage. When this "switch" advance growth is cut back to ground level, it sends up one or more straight, vigorous and healthy shoots that attain a height of over five feet in the first year. With timely assistance it is able to hold its own against weeds, grass and soft wood species. Seedling regeneration on the other hand is weak, slow growing, and unable to compete with weeds and creepers and is for that reason useless for practical purposes. The two essential prescriptions of Mr. Minchin's plan were as follows :—

(1) "Clear-felling of the main tree growth of the year's coupe and removal of all logs, branch wood, and rubbish generally *must* be completed before 15th February, for the growing season of sal commences about then. The soil surface is to be cleared up so that there is nothing to impede the new sal shoots.

(2) Between 15th February and 15th March all advance growth of sal in the 'switch stage' or seedling stage must be cut back flush with the ground."

Burning was not suggested as a part of the operation but it was introduced with success from the very start and found to be the best means of getting rid of debris from the clear-fellings. The regeneration operations have not been carried out at the correct time in every one of the coupes. In certain years there has been a tendency to grant extensions of voidah to coupe contractors and let them continue their fellings during the regeneration period. The heaping and burning of waste material and the cutting back of advance growth were sometimes extended even to May and June, whereas everything should have been completed by the middle of March. Examples are Coupe VII of Brahmansai and Coupe X of Galleri. In such areas, the regrowth from cut-back switches is deprived of more than two months of the season when it will grow well and get a start of every other kind of vegetation, which remains at this time of the year, at a stand still. The other disadvantage of delayed regeneration is that the resulting growth of sal switches is less able to resist the grass and weeds that generally invade the ground in the ensuing monsoon weather. The cutting back of advance growth follows the burning of felling debris. This is necessitated by the fact that after clear-felling there is usually a considerable amount of unsaleable wood lying littered on the ground and unless a good deal of it is burnt away, it is practically impossible to reach the advance growth for cutting it back. But any delay between the burning and the cutting back causes fresh regrowth to spring up from the burnt-back switches and a lot of labour is often wasted in cutting this regrowth back to the ground level.

144. *Cost of regeneration.*—The cost of regeneration in Felling Series I has been reduced from Rs. 6–10–0 per acre in 1920 to Rs. 4 in 1930. In Felling Series II, the practice was to get the heaping and burning done by coupe contractors free of cost and then to cut back the switches departmentally. The cost of the latter work varied from 8 to 11 annas per acre. The results of entrusting the operation to coupe contractors were found to be unsatisfactory. In 1927, the whole regeneration work was taken over by the department and since then the cost has varied from Rs. 3–4–0 to Rs. 4 per acre. Experience shows that the work cannot be efficiently done for less than Rs. 4 per acre under present conditions. Most of the money is spent on heaping and burning waste wood. Until a demand arises that will dispose of this debris there appears to be little possibility of reducing the present costs.

Cost of regeneration per acre.

Year.	Coupe.	Felling Series I.		Felling Series II.	
		Range.	Cost per acre.	Range.	Cost per acre.
			RS. A.		RS. A.
1920	I	Kukuluba ..	6 10	Buguda ..	* 0 8
1921	II	Do. ..	5 14	Do. ..	0 11
1922	III	Do. ..	3 8	Do. ..	0 11
1923	IV	Do. ..	5 0	Do. ..	0 10
1924	V	Do. ..	4 14	Do. ..	0 10
1925	VI	Do. ..	5 8	Do. ..	0 9
1926	VII	Bontha ..	5 0	Do. ..	0 11
1927	VIII	Do. ..	5 0	Do. ..	3 4
1928	IX	Do. ..	4 14	Do. ..	3 15
1929	X	Mojjagoda ..	4 0	Do. ..	4 0
1930	XI	Do. ..	4 0	Do. ..	4 0

* NOTE.—In Felling Series II up to 1926, the cost incurred was only for cutting back the switch growth; the piling and burning having been done by the coupe contractors.

145. *Tending.*—Mr. Minchin's Working Plan prescribed a cleaning in the first year, a first thinning in the fifth year and a second thinning in the tenth year of the life of the crop. These prescriptions were to be regarded as suggestions and the District Forest Officer was allowed some latitude to vary the treatment according to the needs of the crop. Assuming that the new crop started in the middle of March, the cleaning was to be carried out between July and the end of October and to consist of * "(*a*) Cutting back of grass, weeds, shoots of tree species other than sal that are interfering with the young sal and removal of creepers, (*b*) Removal of inordinately fast grown sal shoots of the character of ordinary coppice (except in what would otherwise be 'blanks')—reduction to one good stem of clumps of shoots on one root-system (except in the case of very small regrowth)". Every coupe has benefited by this excellent prescription. Experience has shown that the rainy months of July to September are unsuitable for the execution of the cleaning and that the best period would be October–November. In the subsequent tending, Coupes I and II of both felling series were subjected to different operations. In Series I, climber cutting was done in Coupe I in the fourth and fifth years and a thinning was made in the seventh year. In Coupe II, climbers were cut in the third and fourth years and a thinning was made in the fifth and sixth years. In Series II, climbers were cut in Coupe I in the fourth year and the thinning was made in the fifth year. Coupe II of this series was treated similarly in the third and fourth years. Thus it was evident from the beginning that the crop could not be left to take care of itself, as contemplated in the current working plan, for an unbroken period of five years between the first cleaning and the first thinning and that it needed more intensive tending in the early years. In 1926–27 an innovation was introduced in the right direction. A second cleaning was carried out under the orders of Mr. Richmond, Conservator of Forests, First Circle, in Coupe VII of Brahmansai when the crop was in its second year. This experiment has produced remarkable results. The writer saw the coupe in its fourth and fifth year. The stocking is complete, the sal well grown and the soft woods are kept under proper control. But climbers were making their way up and needed removal. Coupes VIII and IX of Series I have been treated in a similar manner and it is unfortunate that the coupes of Felling Series II did not receive the same degree of attention. As has been stated above

thinnings were executed in the crops at ages varying from four to seven years. In almost all coupes, coppice stems were unduly favoured or at all events no definite preference was given to sal of switch origin. As a result of these thinnings, sal was freed from the over-topping soft woods and climbers, but many of the young sal left standing, bent over having no strength to support themselves. The bending was more noticeable in places of comparatively poor stocking where sal was too widely spaced for its age and thereby was deprived of the support of its neighbours. Where the bent stems have been allowed to grow on in the hope of their recovering by themselves, the results are disappointing. It is found that in these cases several axillary branches shoot up from the arched stem which bends further under their weight and is ultimately broken by a storm. Sal is thus confronted with a number of disabilities in its early stage. The growth after clear-felling is very fast. The first two years are its most critical period during which the crop is overwhelmed with weeds, softwoods and climbers. Two cleanings one in the first year and another in the second, bring the softwoods under control and ensure the establishment of the fullest possible stock of sal. But climbers continue to have their own way and need removal during the fourth year. The crop remains in the sapling stage until the seventh year, with smooth ' carrooty ' bark which is then replaced in the eighth year, by rough corrugated bark. The height at this age will be about 35 feet. The most suitable time for executing the first thinning appears to be the eighth year when the sapling emerges into the pole stage and is in a position to support itself without the aid of its neighbours. In the early years, the young sal has a lanceolate crown which takes up comparatively little space in the top canopy.

146. *Cost of tending.*—The operations in the early years being in an experimental stage, the cost of tending has varied in the different coupes according to the intensity of the works. The cost of first cleaning has ultimately been reduced to about Rs. 3 per acre in Felling Series I and Rs. 2-8-0 in Felling Series II. The difference between the two series is due to the more luxuriant growth usually encountered in Series I. The second cleaning has cost from Re. 1–4–0 to Rs. 2–12–0 in Series I and Rs. 2–8–0 in Series II. The second cleaning if properly done should cost only a few annas less than the first cleaning, under ordinary conditions. If the costs are reduced unduly there is a likelihood that many softwoods and climbers will be left in the interior of the coupe which is liable to escape the notice of inspecting officers. The first thinning has cost Rs. 2–4–0 to Rs. 2–14–0 per acre in Series I and up to Rs. 2–8–0 in Series II. Wherever climber-cutting has been done, the cost has varied from two annas to Re. 1–1–0 per acre.

Cost of tending per acre from 1920-1930.

Coupe.	Felling Series I.				Felling Series II.			
	Range.	First cleaning.	Second cleaning.	Thinning.	Range.	First cleaning.	Second cleaning.	Thinning.
		RS. A.	RS. A.	RS. A.		RS. A.	RS. A.	RS. A.
I ..	.. Kukuluba.	6 11	..	2 11	Buguda ..	3 5	..	2 4
II ..	.. Do.	3 0	..	2 12	Do. ..	2 11	..	1 11
III ..	.. Do.	3 8	..	2 13	Do. ..	2 12	..	2 4
IV ..	.. Do.	2 10	..	2 11	Do. ..	2 14	..	2 8
V ..	.. Do.	2 9	..	2 4	Do. ..	2 8	..	1 12
VI ..	.. Do.	2 9	..	2 14	Do. ..	2 4	..	2 8
VII ..	.. Bontha ..	3 1	1 11	..	Do. ..	2 7	..	..
VIII ..	.. Do. ..	3 1	2 12	..	Do. ..	2 12	..	..
IX ..	.. Do. ..	2 15	1 4	..	Do. ..	1 13	2 8	..
X ..	.. Mojjagoda.	2 15	..	..	Do. ..	2 8	..	..

A disturbing factor that raises the cost of the first cleaning is the appearance of the noxious climber, Mucuna pruriens (' Bidango ') over large areas. It comes into fruit after the month of October and can be satisfactorily dealt with if its presence is detected earlier and steps taken to cut it out in September. The climber does not usually reappear in the second year.

C. Ravine Working Circle.

147. *Main fellings.*—The working plan prescribed annual clear-fellings of about 129 acres in the Ravine Working Circle, based on a 80-year rotation, commencing from 1920–21. The coupes clear-felled in each year are given below :—

Year.	Range.	Reserve.	Coupe.	Area. ACS.
1920–21	Mojjagoda.	Rambha.	I ..	131
1921–22	..	..	II-(a) ..	43
			(b) ..	49
			(c) ..	39
				131
1924–25	..	..	III (a) ..	39
			(b) ..	28
				67
1925–26	..	..	IV (a) ..	26
			(b) ..	6
				32
1926–27	..	..	V (a) ..	26
			(b) ..	15
				41
1927–28	..	..	VI-(a) ..	14
			(b) ..	20
			(c) ..	13
				47
1928–29	..	..	VII ..	* 42
1929–30	..	..	VIII (a) ..	40
			(b) ..	74
				114
			Total ..	605

* Old compartment 6, 5 acres in extent felled in 1928–29 is not shown as it is to be eliminated from the Ravine Circle.

During 1920–21 and 1921–22, the prescribed areas were clear-felled departmentally and all useful timber fit for the saw mill was extracted and sent to Russellkonda. Large quantities of unsaleable wood were left behind and they had to be collected and burnt down in order to clear the ground for regeneration. This clearing of the ground involved great labour and expense, costing Rs. 16 per acre in Coupe I and Rs. 14 in Coupe II. Artificial regeneration in areas deficient in sal advance growth cost a further sum of Rs. 25 per acre. Such expenditure was considered unjustifiable and it was decided that unless contractors could be found to buy the coupes standing, they could not be worked at all owing to the excessive cost of the subsequent regeneration. For these reasons the clear-felling of coupes was stopped in 1922–23. However, the District Forest Officer considered it desirable to continue the extraction of the mature trees for the Russellkonda Saw Mill. For convenience, the compartments of the Ravine Working Circle in Rambha reserve were merged into the Selection Working Circle and exploited together. In addition to the compartments allotted for the year's fellings, others were also taken up ahead of their normal time. It was not then realized that the removal of the few saleable trees from a compartment would reduce it to little or no value from a contractor's point of view. After a break of two years, in 1924–25 the Department succeeded in selling a coupe of half the prescribed size to a contractor and realised a price of Rs. 5 per acre. The contractor was encouraged to burn the unsaleable wood into charcoal and thereby earn increased profits. In the following years it has been possible to sell coupes of limited extent to contractors and get the clear-fellings carried out by them.

Many of the areas that were actually clear-felled should not have been felled at all. Owing to errors in the previous stock-mapping, the "compartments" allotted for the annual coupes contained considerable proportions of poor rocky ground bearing nothing but non-sal species and bamboos. No attempts were made to eliminate such unsuitable areas while the annual coupes were being laid out and the contractors had to incur unnecessary labour and expense in felling an unprofitable type of forest. Compartment 6, of 5 acres, felled in 1928–29, as part of Coupe VII, is one instance of a steep hill-side that should not have been chosen for a coupe. Most of it is bare rock where preservation of the existing growth is necessary for physical reasons. This compartment will be eliminated from the Ravine Working Circle. The remote situation of the compartments and the relative inaccessibility of the hill slopes added to the difficulties of selling the annual coupes. Up to the end of 1929–30, 605 acres have been clear-felled against the prescribed area of some 1,300 acres. The Ravine Working Circle compartments have been completely re-mapped for

this revised plan with a view to exclude the poor and unproductive non-sal grounds and bamboos. (Only areas where bamboos occupy more than 50 per cent of the canopy are excluded.) Certain areas have been added to the Plains Sal Timber or Pole Working Circle. The re-mapping has reduced the area of the Ravine Circle from 10,313 to 6,425 acres. It appears possible to expedite the progress of clear-felling in the Ravine Circle by the formation of two felling series as in the Plains Sal Timber Circle. Further, the difficulties of selling the Ravine coupes can probably be minimised if the coupes are properly laid out admitting only the true sal bearing areas.

148. *Subsidiary fellings.*—According to the prescriptions of the working plan, subsidiary fellings were to be carried out over about 387 acres annually and to consist of two operations. (*a*) Extraction of mature trees that can be utilized economically and (*b*) Improvement fellings intended to benefit the sound members of the upper storey left after the extraction of the mature trees. The exploitable girth was left to the discretion of the marking officer.

(*a*) *Extraction of mature trees.*—The mature trees appear to have been extracted irregularly from different localities. While the areas actually allotted for fellings were falling in arrears, the compartments prescribed for the later years were worked, if it was economical to transport the timber to the sawmill. In Kukuluba range in 1924–25, about 1,200 acres were to be worked including the arrears. Actually, after working about 260 acres, further fellings were stopped because it cost about 6 annas per cubic foot to cart the timber and deliver it at Russellkonda, whereas the price paid by the mill for that timber was only 4 annas per cubic foot. In 1926–27, in Russellkonda Range, the compartments prescribed for 1934–35 were mixed up with the Selection Working Circle and worked for supplying timber to the sawmill. These subsidiary fellings have removed from the compartments the few scattered sal trees that might with advantage have been left as seed bearers for the regeneration of areas that are deficient in sal advance growth. Further, the sale value of the residual forest is now considerably reduced and it may be difficult to induce contractors to buy such areas and carry out the clear-fellings for the department.

(*b*) *Improvement fellings.*—The improvement fellings " did not keep pace with the prescriptions of the working plan. Even in the beginning, it was realized that the departmental fellings would be too expensive to be carried out and attempts were made to lease out the right of improvement fellings to contractors. Most of the compartments were situated in remote localities and were scattered over the whole reserve. The areas felled under this system were as follows :—

Year.	Range.	Reserve.	Area.	Cost of felling per acre.	Price realized per acre.
			ACS.	RS. A.	RS. A.
1920–21 ..	Bontha ..	Paichalia	118	3 9 (118 + 79)	....
		Gogodo	79		
	Buguda ..	Kurcholi	58	....	22 0
			255		
1923–24 ..	Bontha ..	Gogodo	45	....	3 0

In 1920–21, the improvement fellings in Bontha range were executed departmentally at a cost of Rs. 3–9–0 per acre. In Buguda range, a contractor was found to buy the area on lease and a rate of Rs. 22 per acre was obtained. The high price obtained seems to indicate that the fellings must have been heavy. In 1921–22 and 1922–23, departmental working was stopped and it was found impossible to sell any area to contractors. In 1923–24, an area of 45 acres in Bontha range was bought by a contractor at Rs. 3 per acre. By the end of 1923–24, the arrears accumulated to more than 1,200 acres. Owing to the very scattered nature of the fellings in these areas and also to the fact that the fellings if undertaken had to be executed at a loss to the department, the Chief Conservator of Forests ordered that the improvement fellings should be discontinued in the Ravine Working Circle. The areas worked do not appear to have been much improved. The few sal trees that were left, have not responded sufficiently to the extra freedom given to them. The subsidiary fellings on the whole have had a deleterious effect on the prospect of clear-felling

such areas through the agency of contractors. For all the reasons referred to in the preceding paragraphs, subsidiary fellings are not being prescribed in the present working plan.

149. *Regeneration.*—The primary problem in the Ravine Working Circle has been the absence or inadequacy of sal regeneration. To a large extent this was due to the fact that large areas of unsuitable ground devoid of sal, which were fit to grow only softwood species, were included within the Ravine Working Circle.

The working plan contemplated that in the annual coupe of 130 acres, about 80 acres would contain sal regeneration in the switch stage whilst the remaining 50 acres must be regenerated artificially with suitable species like *Pterocarpus marsupium, Cedrela toona, Gmelina arborea,* teak and other species. The District Forest Officer was expected to decide the species to be introduced. In 1920–21, Coupe I of 131 acres was clear-felled and it was expected that about 50 acres would need artificial regeneration. In June-July 1920 about 20 acres were planted with teak, *Gmelina, Pterocarpus marsupium* and *santalinus, Terminalia tomentosa* and *Cedrela toona.* The balance of 30 acres was found to have enough sal regeneration to give a fairly full stocking. The cost of clearing the site was Rs. 16 per acre. The cost of planting came to Rs. 25 per acre. The plants were partly from a nursery and partly dug out from the natural forest. Teak and *Gmelina* appear to have started well; the other species were not so satisfactory. In the unplanted area of 111 acres, the method of natural regeneration adopted was that of the Plains Sal Timber Working Circle. The heaping and burning of waste wood and the cutting back of switch growth cost Rs. 17 per acre. The high cost was due to the fact that a considerable quantity of unsaleable wood lay littered on the ground and it had to be cut and burnt. In 1921–22, Coupe II of 131 acres was felled. It was realized that sal regeneration throughout the coupe could be counted on. Consequently, artificial regeneration was reduced to 10 acres with a view to experiment. In July 1921, approximately 4 acres were planted with *Cedrela toona,* 3½ acres with *Pterocarpus marsupium,* 1½ acres with teak and 1 acre with *Eugenia jambolana.* The cost of clearing the area was Rs. 14 per acre and the cost of planting was Rs. 20 per acre which included weeding up to December 1921. In the remaining area of 121 acres naturally regenerated, the cost of heaping and burning waste wood and cutting back switch growth was Rs. 15 per acre. Artificial regeneration thus cost Rs. 41 per acre in Coupe I and Rs. 34 per acre in Coupe II. In 1923, at the instance of Mr. Bennett, the Chief Conservator of Forests ordered that in future the work should be concentrated on bringing up the natural regeneration instead of spending large sums of money on artificial regeneration. Mr. H. Tireman, the Chief Conservator further remarked, " We have plenty of teak elsewhere and I am opposed to trying to introduce it into these forests where it is evidently out of its element." This point of view is, however, not now being accepted, as teak is a valuable timber and can be grown in selected parts of this forest without difficulty. Not only was the artificial regeneration expensive, but the natural regeneration following the departmental clear-fellings was also costing a good deal of money. The position then was that unless contractors were forthcoming to clear-fell the annual coupes and work the small timber, poles and fuel, no working could be done, as the expense of departmental felling and regeneration was prohibitive. On this principle no coupe was felled or regenerated in 1922–23 or 1923–24. In 1924–25 it was possible to sell 67 acres to a contractor and since then a coupe of small extent has been regenerated every year by the natural method after being worked on contract.

150. *Cost of regeneration.*—The following table shows the cost of regeneration per acre in the several coupes :—

Year.	Coupe.	Natural regeneration.	Artificial regeneration.	Year.	Coupe.	Natural regeneration.	Artificial regeneration.
		RS. A.	RS. A.			RS. A.	
1920–21 ..	I	17 0	41 0	1926–27 ..	V	4 8	..
1921–22 ..	II	15 0	34 0	1927–28 ..	VI	* 1 12	..
1924–25 ..	III	4 13	..	1928–29 ..	VII	4 1	..
1925–26 ..	IV	5 0	..	1929–30 ..	VIII	4 0	..

* The low cost is due to the condition inserted in the contractors agreement that he must do the heaping of wood free of charge.

It is to be noted that the cost of regeneration descended to a reasonable level ever since it was possible to get the coupes clear-felled by contractors. The present cost is about Rs. 4 per acre. Owing to the bad selection of areas for coupes especially in the later years, a considerable amount of time and money have been illspent over unproductive grounds that are devoid of sal and fit to grow only softwood species. All regeneration operations should normally be completed by the middle of March. Excepting in the case of Coupes I and II, the delay in regenerating the other coupes has been considerable. The works have often extended into May and June and consequently the new crops have not had a good start at the beginning of the growing season.

151. *Tending.*—The system of tending the new crops was left to the District Forest Officer to evolve. The working plan did not make exact prescriptions but suggested that (*a*) in regard to plantations one cleaning and one thinning may be required during the period of the plan and (*b*) in regard to the new sal crops a cleaning will be required at the age of six months and a thinning in the fifth year. The cleanings and thinnings appear to have been done on the lines prescribed for the plains sal timber crops. The tending of Coupes I and II became complicated by the severe outbreak of fires in May 1923 and April 1925. Generally, the plantations as well as the natural sal crops have not received even half the attention that was given to the plains sal timber coupes. In Coupe I, of the various species planted in 1920, only *Gmelina* and teak have survived in areas of 3 and 4 acres respectively. In Coupe II, teak is established in a patch of about 1 acre, whilst the other species have disappeared with the exception of a few specimens. In spite of the indifferent attention given to the plantations, teak and *Gmelina* have grown remarkably well and have amply demonstrated their suitability for introduction into the Ravine Circle. The sal in most of the coupes is in a deplorable condition. There is evidence of their having suffered seriously from climbers and miscellaneous species. Bamboos and softwoods have overrun the ground in many places and formed almost pure patches. The present-day practice is to confine the thinning operations to the sal bearing areas and to ignore the non-sal areas. In the sal bearing areas, coppice sal is predominant and there is considerable admixture of competing softwoods. Climbers too are conspicuous. The present unsatisfactory condition of the crops points to the necessity of intensive treatment in their early life.

152. *Cost of tending.*—The cost of tending per acre for Coupes I to VII is given in the following table :—

Cost of tending per acre from 1921 *to* 1930.

Coupe.	Range.		First cleaning. RS. A.	First thinning. RS. A.
I	.. Mojjagoda ..	(*a*)	3 8	..
		(*b*)	2 8	1 8
II	.. ..	(*c*)	6 0	1 9
III	.. Mojjagoda ..		2 8	1 5
IV	.. .. ..		3 1	..
V	.. .. ..		2 7	..
VI	.. .. ..		2 8	..
VII	.. .. ..		2 8	..

(*a*) Cost refers to plantations.
(*b*) Cost refers to sal crops.
(*c*) Two cleanings were done to encourage natural regeneration.

The rate for first cleaning has now settled down to Rs. 2–8–0 per acre. The rate for first thinning has varied from Re. 1–5–0 to Rs. 1–9–0 per acre. The comparatively low rate is accounted for by the fact that the coupes contained many non-sal areas which did not require any thinning. In future, provided the coupe is selected properly, and non-sal areas excluded, the rate is likely to rise to the level of the Plains Sal Timber Circle.

153. *Experiments on sal regeneration.*—With a view to determine the best method of increasing the sal regeneration in the Ravine Working Circle, the writer carried out an experiment in 1928, in Rambha reserve in the neighbourhood of Rambha forest bungalow. Full details of the experiment will be found in Appendix IV. A 2-acre plot was opened in a ravine area. The miscellaneous tree growth under 2 feet in girth, and all bamboos, were cut, and a fire was put through in May 1928, in order to admit sufficient light to the ground and prepare a good germinating seed bed. The intention was to sow one half of the

plot artificially and leave the other half to regenerate by itself from seed falling from the mother trees. 1928 turned out to be a poor seed-year for sal and consequently the experiment relating to natural regeneration was given up as a failure. In one half of the experimental area, five plots were laid out in June 1928, four of which were sown with seeds and one was planted with stumps. Careful enumerations were made in August 1928 and July 1929. The results show that it is possible to produce one-year old seedling regeneration to the extent of about 20,000 per acre by the process of dibbling *selected* fertile sal seed. Regeneration in the seedling stage being of low vitality is of no use in the production of crops by the clear-felling method. The seedlings must progress into the switch stage. It is therefore necessary to continue the investigations as to the extent to which the seedlings will develop into switches and whether this can be achieved within a reasonable period of say, 5 years. The plots will therefore be kept under observation and enumeration of the advance growth will be made periodically and the results recorded. A detailed prescription for this work will be found in paragraph 276 of Part II.

D.—Selection Working Circle.

154. *Fellings for the Russellkonda Saw Mill.*—The working plan prescribed an annual coupe of 10,000 to 15,000 acres based on a twenty-year felling cycle. Reserves were allotted to each year commencing from 1920–21. But the exploitable size of the mature trees was not fixed definitely. It was suggested that some qualities of sal mature at 3 feet 6 inches in girth and others at 6 feet to 7 feet in girth. Within these limits the marking officer was required to exercise his judgment. He was to decide from the appearance of the bark and crown whether the tree was putting on increment sufficient to justify leaving it to grow for a further period of twenty years. Climber cutting was to be done to the marked trees and their neighbours, one year ahead of fellings. The following statement gives the areas worked from 1920–21 to 1927–28 :—

Year.	Prescribed.			Worked.					
	Range.	Reserve.	Area.	Range.	Reserve.	Area (approximate).	Prescribed for the year.	Girth of exploitation.	Species extracted.
			ACS.			ACS.			
1920–21.	Mojjagoda.	Dhimirijoli.	3,699	Mojjagoda.	Dhimirijoli.	1,749	1920–21	4′ 6″	Sal, Terminalia tomentosa, Adina cordifolia.
	Bontha ..	Paichalia.	7,969	..	..	..	..	..	....
1921–22.	Mojjagoda.	Rambha ..	11,674	Mojjagoda.	Dhimirijoli.	1,800	1920–21	4′ 6″	Sal and other species.
				Bontha ..	Paichalia.	350	1920–21	4′ 6″	Sal.
1922–23.	Buguda ..	Kriamba.	10,000	Mojjagoda.	Dhimirijoli.	150	1920–21	4′ 6″	Sal and other species.
					Rambha ..	2,500	1921–22	4′ 6″	Sal.
1923–24.	Buguda ..	Kriamba.	10,181	Mojjagoda.	Rambha ..	9,140	1921–22	4′ 6″	Sal.
				Buguda ..	Kriamba	4,500	1922–23	4′ 6″	Sal. Pterocarpus marsupium and Terminalia tomentosa.
				Surada ..	Rogada ..	15,463 (part).	1926–27	4′ 6″	Do.
1924–25.	Kukuluba.	Gundribadi.	6,048	Buguda ..	Kriamba.	500	1922–23	4′ 6″	Sal, Terminalia tomentosa.
				Surada ..	Rogada ..	15,463 (balance).	1926–27	4′ 6″	Sal, Pterocarpus marsupium and Terminalia tomentosa.
				Bontha ..	Paichalia.	7,619 (part).	1920–21	4′ 6″	Do.
1925–26.	Pondakhol.	Dhowgam.	2,229						
		Dabuki ..	1,202						
	Surada ..	Pippala-ponka.	7,150	Russell-konda.	Baiballi ..	500	1927–28	3′ 6″	Sal, Pterocarpus marsupium.
		Bonda-gocha.	2,951						
1926–27.	Surada ..	Rogada ..	15,463	Russell-konda.	Baiballi ..	17,521 (part).	1927–28	3′ 6″	Sal, Pterocarpus marsupium.
				Buguda ..	Kriamba .	5,000	1922–23	4′ 6″	Sal, Pterocarpus marsupium and Terminalia tomentosa.
				Mojjagoda.	Darpangia.	450	1928–29	4′ 0″	Sal and Pterocarpus marsupium.
1927–28.	Russell-konda.	Baiballi ..	18,021	Buguda ..	Kriamba.	10,181	1923–24	3′ 6″	Sal.
				Mojjagoda.	Darpangia.	8,000	1928–29	3′ 6″	Sal, Pterocarpus marsupium.
				Bontha ..	Brahmana-sai.	5,867	1932–33	3′ 6″	Sal.
				Kukuluba.	Chandra-giri.	14,880 (part).	1934–35	3′ 6″	Sal.

In the actual working of the selection forests, no silvicultural consideration was ever kept in view. Fellings were carried out with the one and only object of feeding the Russellkonda Saw Mill with as much timber as it required. In the ea ly years there was no incentive to extract more trees than would provide the logs which the mill demanded and consequently at the end of 1922–23, fellings were in arrears by about 26,600 acres. This was due to the fact that

the saw mill commenced its working only in April 1922 by which date a large quantity of timber had already been collected at the saw mill depot. The opening of the saw mill had the direct effect of accelerating the exploitation of the selection forests. The Forest Department hoped to put through the saw mill a large variety of species in order to find a ready market for them. The saw mill on the other hand decided to accept only sal and *Pterocarpus marsupium.* The latter being a negligible quantity in the forest, the burden of supplies, fell upon a single species, namely sal. Further, among the sal logs, strict selection was made and only straight and sound timber accepted. Since the saw mill counted upon the Selection Circle as its chief source of supply, the extraction of trees was bound to keep pace with the cutting of logs in the mill. The cost of supplying timber at Russellkonda was another important factor that influenced the working of the forests. The Forest Department was to receive no more than 4 annas per cubic foot supplied to the mill and the cost of supplies had necessarily to be kept below this rate. The reason for abandoning fellings in the Paichalia reserve in 1921–22 was that the cost of timber transport alone came to about 6 annas per cubic foot. At the beginning of 1923–24, the allotted fellings were in arrears by 26,600 acres. In that year about 13,600 acres were made good and in addition, the fellings were extended to Rogada reserve that should normally have come later, in 1926–27. The possibility of extracting timber at a rate below 4 annas per cubic foot was the only consideration for adopting such a course. In 1924–25 the same policy was pursued and up to this time it would appear that a girth of 4′ 6″ was adopted as the minimum exploitable girth. For the greater part of 1925–26, the selection fellings were stopped everywhere because the saw mill was closed for seven months from May to November 1925. The financial prospects of the mill were then under consideration. The mill reopened at the end of November 1925 and as no fellings were in progress, the stock of logs in the depot began to fall short. Therefore in January 1926, telegraphic orders to resume fellings in the Selection Working Circle were issued by the Chief Conservator, and accordingly the District Forest Officer arranged to work those reserves that were situated in the vicinity of Russellkonda. Baiballi reserve prescribed for 1927–28 was immediately taken up and the fellings continued during 1926–27. Every sal tree down to 3′ 6″ in girth was extracted from the most accessible places. Selection fellings were mixed up with the fellings of the Plains Sal Timber and Ravine Working Circles. In the same year, Dharpangia reserve prescribed for 1928–29 was partly felled and trees down to 4′ in girth were extracted. In 1927–28 the whole position of the supplies to the saw mill reached an acute crisis which was followed by a policy to fell in any reserve that would supply the saw mill with timber at an economical rate. Kriamba reserve, Dharpangia (southern half), Brahmansai and Chandragiri reserves prescribed for 1923–24, 1928–29, 1932–33 and 1934–35 respectively, came up simultaneously for felling. Every sal tree down to 3′ 6″ in girth was marked and felled. Only in Chandragiri reserve, exploitation was not carried to its final stage. In June 1928 the saw mill closed and with it the selection fellings.

155. *Result of ' mill fellings '.*—The result at the present day is that almost all the accessible selection forests have been depleted of their best trees both mature and immature for the production of mill-sawn timber. Unfortunately, this illegitimate exploitation received an impetus in April 1924 when the Chief Conservator Mr. H. Tireman ordered that " every tree which is fit for the mill should be felled irrespective of any other consideration ". None of the deviations outlined above have been properly sanctioned. The reserves that were thus over-exploited will undoubtedly require a considerable period of rest. Exactly how much will be necessary, it is difficult now to say. Theoretically ten years of the felling cycle have elapsed. For the balance of ten years, the only forests left are the partially exploited reserves and some others, remotely situated, of which a vast area is either inaccessible or does not contain mature timber. There appears to be no objection to extracting mature trees from these reserves, provided the exploitable girth is fixed relatively high, and no elasticity is allowed. The selection forests need close attention in the future

and this will be facilitated by distributing the work among the several ranges. The yield from the Selection Working Circle during the next ten years is bound to depreciate considerably.

E. Plains Sal Pole Working Circle.

156. *Fellings.*—Of the 33,000 and odd acres of third quality sal, Mr. Minchin's Working Plan allotted 18,359 acres to seventeen different felling series. The rotation was fixed at 25 years. The remaining area of 14,844 acres was left unallotted to be worked at the discretion of the District Forest Officer, whenever a demand arose. In the allotted areas the maximum of all the annual coupes put together was to be 734 acres. The areas worked from 1919–20 to 1929–30 is given in the following statement :—

Year.		Area worked in each range.				
	Russellkonda.	Mojjagoda.	Bontha.	Buguda.	Surada.	Total.
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
1919–20 ..	105	..	30	169	152	456
1920–21 ..	79	..	..	126	169	374
1921–22 ..	154	..	..	150	146	250
1922–23 ..	198	..	..	134	215	547
1923–24 ..	217	26	12	143	200	598
1924–25 ..	264	21	54	154	89	582
1925–26 ..	254	56	48	139	156	653
1926–27 ..	251	26	52	183	203	715
1927–28 ..	307	67	71	185	129	759
1928–29 ..	255	55	90	208	235	843
1929–30 ..	178	61	37	150	126	552
Total ..	2,262	312	364	1,741	1,820	6,329

The total area worked during the past eleven years comes to 6,329 acres or an average of 575 acres per year. Several coupes are wrongly marked in the Control Maps and consequently they have had to be re-surveyed and posted. The re-survey has revealed considerable differences in area and in some cases it is clear that the coupes originally laid out on the ground were over-felled by the contractors. The coupes were all worked by contractors on a lease extending from 1st July to 30th June. The demand for pole coupes has been particularly keen in Russellkonda, Buguda and Surada ranges, moderate in Mojjagoda and Bontha and nil in Kukuluba and Pondakhol. The old stock-mapping of third quality sal had many errors. In a number of instances the stock-mapping compartments contained little or no sal. In laying out the coupes for working, the compartments tinted on the map were adhered to with the result, that considerable areas of broken ground and non-sal have been admitted into some of the coupes. Not only did such coupes fetch low prices but the crops produced on them are to a large extent unfit to tend. Experience proves that the Pole Working Circle has been in the past the most important source of steady revenue. It will continue to be so for many years to come. Considering its importance and future value, the third quality sal has been re-mapped, in great detail for this working plan. Patches down to a minimum size of one acre are shown in the stock-map. Where there is demand, no area is too small to be worth cutting. The reserves that were excluded from remapping are Rambha, Dharpangia, Chokkapad, Ambazora, Gundribadi, Paichalia, Gogodo and Pondakhol. These are remotely situated and there is no likelihood at present of opening any felling series in them. In the light of the revised stock-map, and also in view of the necessity of raising the rotation, a rearrangement of the felling series is necessary, and this has been done for the purposes of the revised working plan.

157. *Regeneration.*—The system of regeneration is simple coppice. The present method of coppicing may continue. The contractor vacates the coupe at the end of June. The growth of the new crop may be said to start from the beginning of July.

158. *Tending.*—Mr. Minchin while recognizing the value of an early cleaning from a silvicultural point of view did not prescribe it, as the operation would be costly. A thinning was prescribed in the sixth year on the basis that a part of the material extracted might be saleable. There was a considerable area of

old coppice crops that had not been tended before and some of them were 15 years old. The old crops were also to be thinned. The whole thinning programme was laid down in the working plan. Owing to the difficulties in selling the yield from thinnings, the untended areas began to fall into arrears. The coupes actually thinned were not taken up in the order given in the programme with the result that the crops which required more urgent attention were ignored. In certain felling series the arrears were solely due to the fact that the untended coupes escaped the notice of the Range Officers from whom the original estimates emanated. Thinnings have now been brought very nearly up to date. There still remain, however, some coupes, 10 to 18 years old, that have never received any tending since the date they were cut. Thinnings have been made in the coppice crops of varying ages. Actually in many coupes the thinning amounted to no more than a cleaning. By the time an untended crop reaches an age of 5 or 6 years, the sal in the sapling stage suffers much damage from the soft-woods and climbers. Where the competition between sal and non-sal is severe, sal proves to be a weak competitor. Its leading shoot down to a height of several feet gets distorted by the overtopping soft-woods and by climbers. Every young crop untended in its early life bears signs of damage. It is clear that sal if it is to be helped at all, needs that help most in the earliest years. At the same time in the case of these coppice crops, one is inclined to restrict the unremunerative tending operations to the very minimum. A cleaning is essential before the first thinning. If there is to be only one cleaning the most suitable age appears to be the third year. The sal may thus be given a start of about 3 years against the regrowth of other species. As long as the soft-woods are kept under control the competition amongst the sal does not become unduly severe until about the fifteenth year. It appears possible to put off the first thinning till the fifteenth year when the thinned material may be expected to be saleable. The cost of thinning has in the past varied from Re. 1 to Rs. 2 per acre.

F. Lower Hill Fuel Working Circle.

159. *Fellings.*—The prescription in this working circle was that the belt of forest between the plains and 700 feet higher up the hills might, if demand arose, be worked for fuel on the simple coppice system with a rotation of 25 years. Felling series were not definitely arranged. But the maximum area workable in each year was fixed at 1,600 acres. During the past 11 years the demand for fuel was being very largely met from the Plains Sal Pole Working Circle and the need to open fuel coupes arose only in very few places in Russellkonda, Bontha and Buguda ranges. In working the Malati Series, the pole coupes have got mixed up with the fuel coupes. The term ‘ Lower Hill Fuel ’ has also created some confusion. Strictly speaking the working circle covered the lower hill forests as distinguished from the higher hill forests of the Selection Working Circle. Actually the meaning was extended to apply to the lower slopes of any kind of hill forests. Consequently we find lower hill fuel coupes opened in the selection forest of Kriamba and in the scrub jungle hill of Kuddapada. Again in this working circle, fuel coupes have been opened in the plains broken ground in Kaliamba and Tiliki reserves. Such deviations from the working plan have not received proper sanction. The areas worked in each range are as follows—In Russellkonda and Buguda ranges the pole coupes and scrub jungle coupes have been separated and are not included in the area figures :—

Year.	Area worked in each range.			
	Russell-konda.	Bontha.	Buguda.	Total.
	ACS.			ACS.
1925–26 ..	56	..	..	56
1926–27 ..	98	..	..	98
1927–28 ..	144	..	..	144

Year.	Area worked in each range.			
	Russell-konda.	Bontha.	Buguda.	Total.
	ACS.	ACS.	ACS.	ACS.
1928–29 ..	180	..	..	180
1929–30 ..	179	58	38	275
Total ..	657	58	38	753

The fuel forests overlap the Bamboo Working Circle. There is as much local demand for bamboo as there is for fuel. Hitherto the practice has been to insist upon the contractors felling bamboo clumps occurring inside the fuel coupes under working. This is not only a very irksome business to a contractor but the proportion of mature bamboo within the limits of the bamboo coupes has thereby been considerably reduced.

160. *Regeneration.*—The method of regeneration adopted is simple coppice. The worked coupes have produced a dense regrowth of various species. The contractor leaves the felled coupe at the end of June and in the following season, coppice shoots spring up and cover the whole area. The crops do not receive any special tending.

G. Scrub Jungle Fuel Working Circle.

161. *Fellings.*—Hills covered with scrub jungle are found only in Russellkonda and Buguda ranges. The treatment prescribed for them was the same as that for the Lower Hill Fuel Working Circle. The District Forest Officer was at liberty to open coupes wherever desirable up to a maximum of 250 acres a year, the rotation being 20 years. The reserves of the Russellkonda range are so situated in the midst of villages that there has been a growing demand for fuel to meet the domestic needs. Near Jiliba lime burning is now an established industry. The old arrangement of felling series does not serve effectively the local requirements. In Sondasolia reserve for example, the working of the two felling series is now converging towards one point. In Binodia the annual coupe is out of proportion to the total area available for working. A rearrangement of all the felling series is essential. There is no special necessity to have a separate working circle for the scrub jungle. The Lower Hill Fuel Circle and the scrub jungle could for simplicity be merged into one Fuel Working Circle with a 25-year rotation. The Scrub Jungle Fuel Circle overlaps the Bamboo Working Circle. As in the case of the lower hill forests, the custom has been to compel the contractor to fell all the bamboo clumps growing inside the fuel coupes. Wherever the fuel coupes have progressed around the hills, the bamboo, for which there is demand, has decreased. The area of scrub jungle worked from 1920–21 to 1929–30 is given below :—

Year.	Area in each range.	
	Russellkonda.	Buguda.
	ACS.	ACS.
1920–21	98	..
1921–22	100	..
1922–23	..	..
1923–24	128	..
1924–25	182	..
1925–26	157	..
1926–27	228	..
1927–28	200	..
1928–29	226	..
1929–30	204	42
Total ..	1,652	42

In many instances the number of the coupe and the area shown on the coupe stones are incorrect.

162. *Regeneration.*—The coupes are regenerated by the simple coppice method. The crops do not receive any special tending.

H. Bamboo Working Circle.

163. *Method of working.*—The working plan suggested felling series in Russellkonda, Mojjagoda, Buguda and Surada ranges on a 5-year rotation. By rotation was meant felling cycle. No special silvicultural rules were considered necessary to protect the bamboo and the District Forest Officer was at liberty to open new series and fix the size of the coupes. The coupes were to be laid out and surveyed by the Range Officer. Seventeen felling series have been opened altogether. In practice, the coupes were defined with natural features as their boundaries but in some of the felling series all sorts of unrecognizable or impracticable limits have been taken. In certain localities the

coupes are unnecessarily large and very much underworked. In such places the contractors ask for the same coupe to be worked over again and show a disinclination to buy coupes far away from the villages. Some series stopped working merely for this reason. The demand for bamboo is local and in order that it should be met effectively, the existing felling series require a thorough rearrangement. There is also the possibility of opening additional series. The felling cycle may vary from 3 to 5 years according to the area of bamboo available in the neighbourhood of groups of villages. The total area of the coupes worked in each range from 1919–20 to 1929–30 is shown below. No coupes were worked in Kukuluba range.

Year.	Area worked in each range.							
	Russell-konda.	Mojjagoda.	Kukuluba.	Bontha.	Buguda.	Surada.	Ponda-khol.	Total.
	ACS.	ACS.		ACS.	ACS.	ACS.	ACS.	ACS.
1919–20	6,415	..	..	..	..	800	..	7,215
1920–21	1,270	2,500	..	..	29	1,400	..	5,199
1921–22	2,938	2,500	..	..	..	1,400	..	6,838
1922–23	4,160	858	..	..	960	1,250	..	7,228
1923–24	4,720	5,500	..	..	725	2,625	..	13,570
1924–25	6,135	2,500	..	..	700	1,800	..	11,135
1925–26	3,503	2,215	..	..	350	900	..	6,968
1926–27	3,158	2,757	..	946	500	2,460	..	9,821
1927–28	3,399	3,440	..	1,200	1,010	1,900	..	10,949
1928–29	4,075	2,263	..	830	752	1,230	..	9,150
1929–30	5,240	3,220	..	914	758	2,800	778	13,710

164. *Control.*—According to Mr. Minchin's Working Plan, all the works done, outturn, expenditure, revenue, etc., in each year were to be concentrated in one Control Journal. No definite control forms were prescribed. A Control Journal has been maintained for each working circle and in it all sorts of information is entered without any arrangement. Many entries are incomplete and incorrect. Towards the end of 1927, the posting of the journal for the preceding two years fell into arrears and it was brought up to date when a change occurred in the District Forest Officers. The Control Journal did not provide an effective means of watching the progress of the works from year to year. The working of the Russellkonda Saw Mill introduced complications in almost all working circles. The prescriptions of the working plan have been seriously contravened and most of the deviations have not been properly sanctioned. In 1926 a register called the Regeneration Ledger was introduced for recording the details of work done in each regenerated coupe of the Plains Sal Timber and Ravine Working Circles. It was not until 1929 that the entries relating to the previous years were posted and brought up to date. Coupe histories have recently been opened for the Plains Sal Timber Working Circle. For controlling the prescriptions of the revised working plan, suitable control forms will be prescribed.

165. *Officers in charge.*—During the period from April 1919 to March 1930 there have been frequent changes in the District Forest Officers who held charge of the Ghumsur forests. The administration has been adversely affected on this account. In 1925, Mr. Minchin commented on it in his inspection note on the Ghumsur forests in the following terms : " In the development of methods generally, something has been lost owing to inevitable transfers of District Forest Officers. It took me personally two good years to begin to get the gang of Ghumsur forests, to learn the language a little, to know my way about, to know the local people and (in gradation) to know whom to believe. A real 'live-wire' might get on even terms with the district more quickly ; but my successors have been denied even the opportunity." The following is a list of the officers who held charge :—

(1) Mr. A. A. F. Minchin, from 1st April 1919 to 4th October 1919.

(2) Mr. V. Narayana Ayyar, from 5th October 1919 to 19th November 1919.

(3) Mr. A. A. F. Minchin, from 20th November 1919 to 5th October 1920.

(4) Mr. Said-ud-din Ahmed, from 6th October 1920 to 26th November 1920.

(5) Mr. E. M. Crothers, from 27th November 1920 to 23rd February 1921.

(6) Mr. A. Wimbush, from 24th February 1921 to 31st July 1922.

(7) Mr. H. P. Ward, from 1st August 1922 to 22nd October 1922.

(8) Mr. A. Wimbush, from 23rd October 1922 to 1st February 1923.

(9) Mr. O. H. C. Shelswell, from 2nd February 1923 to 9th February 1923.

(10) Mr. J. H. Longrigg, from 10th February 1923 to 16th March 1923.

(11) Mr. H. P. Ward, from 17th March 1923 to 19th May 1923.

(12) Mr. J. H. Longrigg, from 20th May 1923 to 6th May 1925.

(13) Mr. F. D. Ardagh, from 7th May 1925 to 22nd April 1926.

(14) Mr. J. C. Wrench, from 23rd April 1926 to 17th April 1927.

(15) Mr. D. L. Sathe, from 18th April 1927 to 7th December 1928.

(16) Mr. W. G. Dyson, from 8th December 1928 to 5th September 1929.

(17) Mr. R. H. Mitchell, from 6th September 1929 to 14th September 1929.

(18) Mr. A. Raju Nayakar, from 15th September 1929 to 2nd January 1930.

(19) Mr. W. G. Dyson, from 3rd January 1930 to 31st March 1930 and to date.

SECTION 4—FIRE PROTECTION AND GRAZING.

166. *Fire protection classified.*—For purposes of fire protection, the Ghumsur forests are divided into three classes : (1) Rigidly protected ; under which is included the plains sal timber blocks marked out under the old working plans of 1903–05, and the worked coupes of the Plains Sal Timber, Pole, Ravine and Fuel Working Circles. These areas are protected on all sides by fire lines 15 feet wide ; (2) Partially protected ; under which come the reserves whose frontier lines only are fire traced to a width of 60 feet ; (3) Unprotected ; in which the preserves are generally protected without burnt fire lines. The Zamindari and the Agency forests that adjoin Ghumsur burn every year and are a constant menace to the Government forests of Ghumsur.

167. *Causes of fires.*—The plains sal forests have become practically immune from fire whilst the hill forests get burnt in varying extent year after year. The causes of such fires as occur at the present time are—

* " (*a*) Firing of the jungle for hunting purposes.

(*b*) Firing of the jungle adjoining the villages to drive away wild animals.

(*c*) Travellers using rights of way, kindle fires for cooking or smoking and allow the fire to take care of itself.

(*d*) Fires crossing the boundaries from the zamindari and Agency forests.

(*e*) Firing by graziers to obtain fresh grass is not of frequent occurrence but still it is an occasional cause of fires."

The forests are liable to get burnt from the middle of February to about the middle of June. The most dangerous months are April and May and a large number of fires break out during this period. The following statement shows the number of fires and the area burnt in each year from 1920 to 1929. Rainfall figures of Russellkonda station for the months of February to May are also added by way of interest :—

Year.	Rainfall at Russellkonda. In the year.	In February to May. Rainy days.	In February to May. Rainfall.	Fires. Number.	Fires. Area burnt.
	INCHES.		INCHES.		ACS.
1920 ..	39·49	12	6·47	23	1,218
1921 ..	43·03	8	1·56	145	112,571
1922 ..	51·79	6	3·24	86	38,296
1923 ..	46·77	12	6·47	48	12,253
1924 ..	59·89	8	8·84	55	17,688
1925 ..	64·38	13	10·26	63	15,857
1926 ..	58·81	22	13·28	7	426
1927 ..	61·78	13	4·15	71	63,724
1928 ..	62·40	13	10·00	43	25,746
1929 ..	37·02	9	2·51	61	22,486

Rains in February to May are invaluable in keeping the forests green. Such rains it would appear have a distinct bearing upon the fire protection

problem. The exceptionally severe fire season of 1921 stands in vivid contrast to that of 1926, a season of phenomenal success. In 1921, the precipitations in February to May were extremely low being 1·56 inches, and this probably accounted for the 145 fires which burnt an area of 112,571 acres. In 1926, the rainfall for the corresponding period was 13·28 inches very abnormal, and probably largely as a result of this, there were only seven fires which burnt a small area of 426 acres. But the occurrence of drought or of abnormal rains is impossible to predict.

168. *Kondhs and fire protection.*—Most of the fire tracing work is carried out with the help of the Kondhs. Their co-operation is also enlisted in the prevention and putting out of fires in return for which they are awarded annual concessions of ploughs, house building materials, dead firewood, free grazing and minor forest produce. The Kondhs of Pondakhol range are given special rewards of the value of about Rs. 200 in the shape of rice, cloths, snuff, beads, cheroots and crimson puggrees to head men, for rendering active assistance in fire-protection operations. It is generally believed that the Kondhs themselves especially in the remoter places set fire to the forests mainly to track the game and to facilitate their moving about in the collection of minor forest produce. But cases of Kondh incendiarism are extremely hard to detect.

The maintenance of good relations with the Kondhs is an important matter in the protection of the Ghumsur forests. In the absence of their co-operation the forests will be in ever increasing danger from fire. Without the Kondh it is practically impossible to fire trace the 60-foot frontier lines most of which run across steep and difficult country where no other labour could be induced to work. Fires at the present day are nothing when compared to what they were about 25 years ago. A lot of pioneer work has already been done since Mr. S. Cox wrote his valuable report on the fire protection of the Ghumsur forests in B.P. Forest No. 109 of 3rd June 1907. The present degree of success is directly due to the unceasing tact and patience exercised continuously in securing the goodwill and co-operation of the jungle tribes. In this connexion the names of Messrs. S. Cox and H. C. Bennett are most prominent.

169. *Mapping of fire lines.*—Hitherto all the fire protection work was being carried out with very little knowledge of the position of the fire lines and the manner in which the forests were divided. For the revised plan, all the fire lines have been inspected and represented on the maps. It is now obvious that there are too many unnecessary fire lines in some of the plains forests on which further expenditure will not be justified. Typical examples are Kurcholi B and Panchabhuti reserves where the fire lines other than those around the worked coupes are no longer necessary merely to protect the third quality sal forest.

170. *Cost of fire protection.*—The cost of fire tracing the 15-foot lines is Rs. 3–8–0 per mile. Clearing the line costs Rs. 2, first burning Re. 1 and second burning As. 8. The cost of fire tracing the 60-foot outer boundary is Rs. 10 per mile. Line clearing costs Rs. 6, first burning Rs. 3 and second burning Re. 1. In addition to the burning of the lines, fire patrols are employed for a period of four months in the fire season. The expenses of fire tracing the lines adjoining the Feudatory States of Dasapalla and Niagarh and the Zamindaris of Dharakot and Bodogoda are borne by the chiefs and zamindars concerned (vide G.Os. No. 186, Revenue, dated 20th January 1911, and No. 2684, Revenue, dated 8th September 1913). In the case of Khallikote and Attagada Estate the expenses are shared between Government and the Estate (vide C.C.P. Ms. No. 241, dated 3rd May 1920). Ronaba and Korada zamindaris pay nominal sums of Rs. 20 and Rs. 10, respectively. But the work is carried out by the Ganjam forest staff. The total length of fire lines estimated for 1930 is 1,072 miles. The length of fire lines as well as the expenditure have been increasing steadily year after year on account of the addition of a large number of worked coupes. In 1920, the cost of fire protection was Rs. 5,976. In 1929 the cost was Rs. 7,076, an increase of Rs. 1,100. Retrenchment is possible and necessary, and may be effected by abandoning the unnecessary fire lines in the plains forests. The lines of the worked fuel coupe

need not be fire-traced after a period of three years. The expenditure incurred on fire protection from 1923 to 1929 is given below :—

Year.	Length of fire lines.	Expenditure incurred.	Year.	Length of fire lines.	Expenditure incurred.	Year.	Length of fire lines.	Expenditure incurred.
	MILES.	RS.		MILES.	RS.		MILES.	RS.
1920 ..	766	5,976	1924 ..	915	4,274	1927 ..	1,021	6,697
1921 ..	790	5,979	1925 ..	932	5,327	1928 ..	1,043	6,962
1922 ..	802	5,084	1926 ..	997	5,742	1929 ..	1,049	7,076
1923 ..	893	5,632						

171. *Grazing.*—Goats are rigidly excluded from all Reserved Forests. The cattle that graze in the reserves vary from 40,000 to 44,000 and the grazing revenue is Rs. 9,000 to 10,000 per annum. The forests are not greatly in demand for grazing purposes. Cattle graze in the Reserves only at certain times of the year. The grazing fees are :—

	RS.	A.	P.
Sheep	0	1	6
Cows	0	3	0
Buffaloes	0	6	0

The areas closed to grazing are the sal blocks and the worked coupes of the Plains Sal Timber, Pole, and Ravine Working Circles. The fuel coupes are closed for the first five years. The number of cattle that grazed in the Reserves and the grazing revenue collected from 1919–20 to 1929–30 is shown below :—

Year.	Cattle.				
	Buffaloes.	Cows and bullocks.	Sheep.	Total number of cow units.	Grazing revenue.
					RS.
1919–20 ..	7,032	28,879	144	43,015	8,065
1920–21 ..	7,920	34,763	146	50,676	9,502
1921–22 ..	6,634	32,858	92	46,172	8,657
1922–23 ..	6,786	35,228	136	48,868	9,163
1923–24 ..	7,422	35,450	278	50,433	9,456
1924–25 ..	6,866	37,751	221	51,594	9,674
1925–26 ..	7,291	35,128	125	49,773	9,332
1926–27 ..	7,440	34,512	303	49,544	9,289
1927–28 ..	7,084	36,632	433	51,017	9,566
1928–29 ..	6,885	35,951	326	49,884	9,353
1929–30 ..	6,417	38,457	610	51,596	9,692

NOTE.—The figures include those of Berhampur range. The total number of cattle is expressed in terms of cow units. One buffalo is equivalent to two cows and one cow is equivalent to two sheep.

SECTION 5.—SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN.

172. *Buildings.*—Ghumsur is fairly well provided with forest rest-houses and subordinates quarters. The rest-houses are thatched or tiled and equipped with a limited amount of furniture. The older sheds at Tilisingi and Osurobandho date from 1891 and are of a type designed by Mr. A. W. Lushington, C.I.E., then the District Forest Officer. The circuit house at Russellkonda is for Gazetted Officers only. It is furnished with cutlery and crockery and a butler is employed to give service. Forest rest-houses are in charge of the District Forest Officer subject to the general control of the Collector and forest officers of the rank of Rangers and upwards are entitled to priority of occupation. The following is a list of buildings in charge of the Forest department at the end of March 1930 :—

Name of the building.	Year of acquisition or construction.	Book value on 1st April 1930.
Buildings.		
RUSSELLKONDA RANGE.		
REST HOUSES.		
		RS.
1. * Hathiguda rest house, out-houses and stables.	1891–92	1,495
2. * Baiballi rest house, out-houses and stables.	1893	756
3. * Kaliamba rest house, out-houses and stables.	1908–10	1,588
RUSSELLKONDA RANGE—*cont.*		
RANGE OFFICER'S QUARTERS.		
		RS.
4. Range Officer's quarters at Russellkonda.	1916–17	1,556
5. Kitchen attached ..	1917	214
6. Latrine attached ..	1917	35
FOREST GUARD'S QUARTERS.		
7. * At Gangapur ..	1911–12	65
8. * At Kontaipalli ..	1911–12	136
9. * At Ballipodaro ..	1911–12	134

Name of the building.	Year of acquisition or construction.	Book value on 1st April 1930. RS.
RUSSELLKONDA RANGE—*cont.*		
FOREST GUARDS QUARTERS—*cont.*		
10. * At Hathiguda ..	1911	105
11. * At Potharapalli ..	1926–27	78
12. * At Kullada ..	1926–27	78
Total ..		6,240
Buildings—cont.		
MAJJAGODA RANGE.		
REST HOUSES.		
13. * Circuit house at Russellkonda.	1891–92	3,640
14. Godowns attached 15. Kitchen attached	1908–09	519
16. Motor shed attached.	1922–23	542
17. Second kitchen attached.	1929	518
18. Rambha rest-house out-houses.	1904–08	962
19. Balinkia rest-house, kitchen and stables.	1922–24	5,676
RANGER'S INSPECTION SHED.		
20. * Kupati shed outhouses.	1911	140
21. * Balinkia shed ..	1924–25	375
22. * Ranikiari shed ..	1924–25	34
23. Mojjagoda shed (old police station).	1925–26	600
24. Kitchen attached ..	1929	218
25. * Gutliguda shed ..	1929	63
26. Combined Russellkonda and Mojjagoda Range office at Russellkonda.	1903–04	1,086
EXTRA ASSISTANT CONSERVATOR'S QUARTERS.		
27. * Extra Assistant Conservator's quarters at Russellkonda.	1913	3,074
28. Kitchen and stables attached.	1913–14	279
29. Clerk's godowns ..	1915–16	615
RANGE OFFICER'S QUARTERS.		
30. Mojjagoda Range Officer's quarters at Russellkonda.	1919–20	1,787
31. Kitchen attached ..	1919–20	476
32. Latrine attached ..	1919–20	40
33. * Combined stables for Russellkonda and Mojjagoda Range Officers.	1919–20	285
FORESTER'S QUARTERS.		
34. Forester's quarters at Chahali.	1915–16	1,002
35. Forester's quarters at Rambha.	1925–26	993
FOREST GUARD'S QUARTERS.		
36. * At Galleri ..	1910–11	60
37. * At Ranikiari ..	1924–25	161
38. At Mojjagoda (old police station).	1925–26	1,200
39. * At Gundribadi ..	1925–26	99
40. * At Durgaprasad ..	1925–26	80
41. * At Rambha ..	1925–26	80
42. * At Biripadaro ..	1927–28	87
Total ..		24,691

Name of the building.	Year of acquisition or construction.	Book value on 1st April 1930. RS.
KUKULUBA RANGE.		
REST-HOUSES.		
43. * Gayagonda rest-house ; kitchen.	1920-	1,693
44. * Tilisingi rest-house, stables, kitchen.	1890–92	861
45. * Motor shed attached.	1925–26	64
46. Motor shed on Tilisingi river.	1927–28	Constructed by the Forest Guards, Training School.
47. Tarasingi rest-house, kitchen, stables.	1924	4,405
48. Bodogundribadi rest-house ; kitchen.	1928–29	3,306
RANGERS INSPECTION SHED.		
49. * Kattachira shed ..	1925–26	40
RANGE OFFICE.		
50. Kukuluba and Bontha Range offices at Tarasingi.	1911–12	1,638
RANGE OFFICER'S QUARTERS		
51. Kukuluba Range Officer's quarters ; latrine at Tarasingi.	1911–12	1,853
52. Kitchen attached ..	1920	170
53. * Combined stables for Kukuluba and Bontha Range Officer.	1919–20	328
RANGE CLERK'S QUARTERS.		
54. Combined Range Clerk's quarters for Kukuluba and Bontha Range clerks at Tarasingi.	1912–13	1,030
RANGE PEON'S QUARTERS.		
55. Combined quarters for Kukuluba and Bontha Range peons at Tarasingi.	1912–13	231
FORESTER'S QUARTERS.		
56. Forester's quarters at Gayagonda.	1925–26	1,053
FOREST GUARD'S QUARTERS.		
57. * At Bodogundribadi.	1908	Not known.
58. * At Gayagonda ..	1925	78
59. * At Raigocha ..	1911	79
60. * At Sarangapatta ..	1925	60
61. * At Tarasingi ..	1925–26	82
62. * At Doloko	1925–26	40
63. * At Kattachira ..	1927–28	88
64. * At Tilisingi ..	1927–28	80
Total ..		17,179
BONTHA RANGE.		
REST-HOUSES.		
65. * Jaganadprasad rest-house, kitchen, stables.	1925–26	462
66. * Bontha rest-house, kitchen, stables.	1909	1,056
67. * Gogodo rest-house, kitchen, stables.	1910–11	1,036
68. * Gerada rest-house, kitchen, stables.	1913–14	876
RANGE OFFICER'S QUARTERS.		
69. * Bontha Range Officer's quarters at Tarasingi.	1912	1,828
70. Kitchen and latrine attached.	1912	695

	Name of the building.	Year of acquisition or construction.	Book value on 1st April 1930. RS.
	Buildings—cont.		
	BONTHA RANGE—*cont.*		
	FORESTER'S QUARTERS.		
71.	* Forester's quarters at Gerada.	1927–28	160
72.	* Forester's quarters at Tarasingi.	1925–26	67
	FOREST GUARD'S QUARTERS.		
73.	* At Jaganadprasad	1914	58
74.	* At Gogodo ..	1903–04	32
75.	* At Tarasingi ..	1919	61
76.	* At Bontha ..	1920	61
77.	* At Kimharkhoni ..	1920	43
78.	* At Gerada	1921	63
	Total ..		6,498
	BUGUDA RANGE.		
	REST-HOUSES.		
79.	* Kurcholi rest-house, kitchen, stables.	1925–27	1,261
80.	* Panchabhuti rest-house, kitchen, stables.	1908–09	2,007
81.	* Kulapani rest-house, kitchen, stables.	1919–21	3,241
82.	* Nuapalli rest-house, kitchen and stables.	1908–09	3,325
	RANGER'S INSPECTION SHED.		
83.	* Moraipalli shed ..	1926–27	60
84.	* Nagiri shed ..	1926–27	55
85.	* Bhagavanpur shed.	1926–27	55
86.	* Kumundi shed ..	1926–27	55
	RANGE OFFICER'S QUARTERS AND OFFICE.		
87.	Combined Range Office and quarters at Buguda.	1911–12	2,150
88.	Kitchen attached ..	1914–15	143
89.	* Stables attached ..	1922–23	50
90.	Latrine attached ..	1912–13	35
	RANGE PEON'S QUARTERS.		
91.	* Range Peon's quarters at Buguda.	1911–12	100
	FORESTER'S AND FOREST GUARD'S QUARTERS.		
92.	* Combined quarters at Kurcholi.	1919–20	60
93.	Combined quarters at Bhagavanpur.	1925–26	1,130
	FOREST GUARD'S QUARTERS.		
94.	* At Kothakola ..	1924–25	66
95.	* At Tanapalli ..	1926–27	55
96.	* At Kuddapada ..	1924–25	76
97.	* At Manitara ..	1913–14	81
98.	* At Panchabhuti ..	1917–18	42
	Total ..		14,047
	SURADA RANGE.		
	REST-HOUSES.		
99.	* Osurobandho rest-house, kitchen, stables.	1891–92	1,030
100.	* Rogoda rest-house, kitchen and stables.	1907	815
	RANGER'S INSPECTION SHED.		
101.	* Latipada shed ..	1923–24	80
	RANGE OFFICER'S QUARTERS AND OFFICE.		
102.	Combined Range office and quarters, kitchen, stables, latrine (1914).	1909–10	2,360
	FORESTER'S QUARTERS.		
103.	At Osurobandho ..	1919	170
104.	At Latipada ..	1927–28	325

	Name of the building.	Year of acquisition or construction.	Book value on 1st April 1930. RS.
	SURADA RANGE—*cont.*		
	FOREST GUARD'S QUARTERS.		
105.	At Latipada ..	1911–12	120
106.	* At Surumoni ..	1911–12	50
107.	* At Osurobandho ..	1910	40
108.	* At Bondagocha ..	1904	64
109.	* At Rogoda ..	1926	58
110.	* At Dantalingi ..	1911–12	48
111.	* At Rangaballi ..	1911–12	40
112.	* At Dumu Dumi ..	1911–12	84
113.	* At Sindhukuppa ..	1927–28	55
	Total ..		5,939
	PONDAKHOL RANGE.		
	REST-HOUSES.		
114.	* Gazilabadi rest-house, kitchen.	1903–04	340
115.	* Gombhariguda rest-house and outhouses.	1911–12	680
116.	* Adiponka rest-house, kitchen.	1911–12	680
117.	* Pajjibara rest house, outhouses.	1911–12	680
118.	* Minajadi rest house, outhouses.	1910–12	815
119.	* Budaguda rest-house, stables.	1920	1,857
120.	* Kitchen attached ..	1927–28	75
	RANGER'S INSPECTION SHED.		
121.	Jeeracuva shed ..	1911–12	1,284
	RANGE OFFICER'S OFFICE AND QUARTERS.		
122.	Combined Range Office and quarters, stables, kitchen, at Gazilabadi.	1910–11	2,437
123.	Stores house attached to Range Office at Gazilabadi.	1910–12	1,252
	RANGE CLERK'S QUARTERS.		
124.	Range Clerk's quarters at Gazilabadi.	1910–11	617
	FORESTER'S QUARTERS.		
125.	At Ramanabadi ..	1911–12	1,285
126.	At Adiponka ..	1911–12	1,340
127.	At Pajjibara ..	1913	1,174
	Total ..	..	14,516
	Grand total of all ranges ..	..	89,110

* NOTE.—All thatched buildings are indicated by an asterisk.

173. *Wells.*—Wells have been constructed in the following places in Ghumsur :—

	Locality.	Year of construction.	Cost of construction.
	RUSSELLKONDA RANGE.		RS.
1.	At Hathiguda rest-house.	1901–02	88
2.	At Baiballi rest-house.	1899–1900	88
3.	At Kaliamba rest-house.	1919–20	204

Locality.	Year of construction.	Cost of construction.
Mojjagoda Range.		
4. At Extra Assistant Conservator's quarters at Russellkonda.	1914–15	315
5. At Rambha rest-house.	1907–08	149
6. At Russellkonda Circuit house.	1918–19	339
7. At Balinkia	1921–22	600
Kukuluba Range.		
8. At Tarasingi rest-house.	1910–11	160
9. At Gayagonda-rest house.	Prior to 1919.	80
10. At Bodogundribadi rest-house.	Do.	66
Bontha Range.		
11. At Jaganadprasad rest-house.	Prior to 1919.	Not known.
12. At Gogodo rest-house.	1916–17	166
13. At Gerada rest-house.	1916–17	140
14. At Bontha rest-house.	Prior to 1919.	66
Buguda Range.		
15. At Buguda Range Officer's quarters.	1910–11	250
16. At Kurcholi rest-house.	Prior to 1919.	Not known.
17. At Nuapalli rest-house.	1911–12	156
18. At Panchabhuti rest-house.	1913–14	230
Surada Range.		
19. At Rogoda rest-house.	1911–12	162
20. At Osurobandho rest-house.	1900–01	83
Pondakhol Range.		
21. At Gazilabadi rest-house.	1905–06	101
22. At Pajjibara rest-house.	1911–12	160
23. At Budaguda rest-house.	1919–20	240
Total		3,843

174. *Roads and bridges.*—The forest roads in this district are mostly earthen roads. In some of them metal or gravel has been added from time to time during the annual repairs. The width of the roadway varies from 10 to 14 feet and the side drains are 2 to 3 feet wide at the surface, 1 foot deep and 1 foot wide at the base. On sloping ground in hill sections the work is usually half cutting and half embankment. Inclusive of small culverts and Irish bridges (but exclusive of bridges) the roads have cost on plain ground with alluvial soil Rs. 200 to Rs. 300 per mile, in moderately easy hill country Rs. 600 to Rs. 1,000 per mile and in steep rocky hill sections, where much rock blasting is required, Rs. 1,100 to Rs. 1,600 per mile. The annual repairs consist of clearing the side drains and metalling or gravelling the surface in the worst places. The following is a list of the roads maintained by the Forest department. The cost of Irish bridges, culverts, etc., is included in the cost of the road. Besides the roads mentioned below, there are numerous cart-tracks in the plains forests, along which carts travel easily almost everywhere :—

Roads.

Range.	Name of the road.	Length. M.	F.	CH.	Year of construction.	Cost of construction. RS.
Russellkonda ..	1. Tiliki-Rogoda road	4	0	0	1897–98.	1,056
	2. Russellkonda-Khalagam road, from Loharakhandi river to Khalagam.	5	0	0	1912–13.	1,210
	3. Hathiguda-Tiliki road	1	3	0	Prior to 1919.	Not known.
Mojjagoda	4. Rambha-Galleri road. (One mile metalled up to Rambha rest-house.)	8	6	0	Prior to 1919.	3,750
	5. Galleri-Ballabadi road	3	1	5	1913–14.	4,189
	6. Russellkonda-Khalagam road, up to Lohorakhandi river	5	2	0	1909–12.	3,093
	7. Budli-Balabadi road	1	0	9	1920–21.	731
	8. Rambha-Balinkia road	2	6	8	1920–21.	4,170
Kukuluba	9. Famine road to river at Tilisingi (metalled)	0	3	0	1918–19 (by P.W.D. as famine work).	Not known.
	10. Captain Irwin's road at Tilisingi (metalled.)	1	2	0	1921–22.	6,585
	11. Tilisingi-Tarasingi road via Cox's corner	6	3	0	1892.	* 2,100
	12. Tilisingi-Tarasingi road via Kriamba.	6	0	5	1927–30.	Work incomplete.
	13. Tarasingi-Kukuluba road	2	6	0	1921.	500
Buguda	14. Kurcholi-Nuapalli road	5	4	0	1913.	1,735
	15. Kurcholi-Panchabhuti road ..	1	0	0	Prior to 1919.	Not known.
	16. Kulapani-Koradabadi road ..	2	6	0	1920–21.	1,523
	17. Talasoro-Ratnadevi road	1	3	0	1919	375
	18. Nuapalli-Bodothonda road ..	1	0	0	1919	200
	19. Kurcholi-Kondrai road	1	2	5	1919	900
Surada	20. Osurobandho-Minajadi road ..	7	0	0	1910	5,600
	21. Osurobandho rest-house road ..	0	2	7	1910	455
	22. Rogoda-Tiliki road	3	5	0	1897–98	1,000
	23. Latipada-Rogoda road	6	0	0	Old cart-track improved.	Nil.
Pondakhol ..	24. Pondakhol boundary-Adigudi road.	5	4	0	1914	5,750
	25. Adigudi-Adiponka road	6	7	8	1914	5,000
	26. Gazilabadi-Adigudi road	8	5	4	1914	7,400
	27. Gazilabadi rest-house road	1	0	0	1919	Not known.
	Total ..	100	3	1		57,322

* Note.—The cost includes the original construction of Captain Irwin's road, 1 mile 2 furlongs and of a part of Tilisingi-Tarasingi road via Kriamba, 1 mile 3 furlongs.

SECTION 6.—PAST YIELD.

175. *Yield prior to* 1919–20.—Detailed and correct figures of yield from the reserved forests for the period prior to 1919–20 are not available. The total yield from 1913–14 to 1918–19 is classified in Mr. Minchin's Working Plan as follows :—

Year.	Timber extracted depart-mentally.	Timber removed by purchasers.	Total.	Year.	Timber extracted depart-mentally.	Timber removed by purchasers.	Total.
	C.FT.	C.FT.	C.FT.		C.FT.	C.FT.	C.FT.
1913–14 ..	42,000	980,000	1,022,000	1916–17 ..	15,000	134,000	149,000
1914–15 ..	56,000	386,000	442,000	1917–18 ..	19,000	251,000	270,000
1915–16 ..	96,000	306,000	402,000	1918–19 ..	88,000	158,000	246,000

The timber extracted departmentally came principally from the unreserves and it is believed that the timber removed by purchasers was also from the unreserves. "The timber from the reserves was principally dead and dying trees removed in light improvement fellings and wind falls, the remainder was timber from the unreserves."

176. *Yield from* 1919–20 to 1929–30.—Since the introduction of Mr. Minchin's Working Plan the yield is recorded separately for each range under timber, poles, fuel and bamboos. Detailed figures under each species have not been maintained. From the nature of the fellings carried out for the saw mill it is reasonable to conclude that at least 90 per cent of the yield under timber is sal. Under timber, the departmental figures are mixed up with contractor's figures. The yield under poles, fuel and bamboos is based largely on contractor's figures. For the years 1919–20, 1920–21, 1926–27 and 1927–28 the yield in each range separately and the yield under 'bamboos' are not available. For these years, only the totals are furnished.

177. Total annual outturn from the Ghumsur forests by ranges.

Year.	Russellkonda. Timber.	Russellkonda. Poles	Russellkonda. Fuel.	Russellkonda. Bamboos.	Mojjagoda. Timber.	Mojjagoda. Poles	Mojjagoda. Fuel.	Mojjagoda. Bamboos.	Kukuluba. Timber.	Kukuluba. Poles.	Kukuluba. Fuel.	Kukuluba. Bamboos.	Bontha. Timber.	Bontha. Poles.	Bontha. Fuel.	Bontha. Bamboos.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.
1919–20 ..	Detailed figures are not available.															
1920–21 ..	Do.															
1921–22 ..	852	3,993	52,300	107,675	110,367	1,376	75,082	270	38,230	..	89,340	3,830	22,248	2,755	522	1,010
1922–23 ..	466	2,907	50,240	128,818	41,551	31,105	422	64,513	35,337	6,143	5,140	2,640	4,232	145	500	2,200
1923–24 ..	4,151	58,221	446,710	149,610	197,971	4,208	104,399	39,100	35,016	1,040	27,425	600	23,094	3,982	3,580	..
1924–25 ..	19,674	60,464	401,756	225,179	18,855	1,002	79,361	52,650	64,118	..	103,343	8,760	45,479	10,409	15,416	3,800
1925–26 ..	34,016	9,935	84,527	174,117	76,527	1,009	26,475	114,910	243	..	..	311	95,869	12,190	33,404	5,582
1926–27	Detailed figures are not available.															
1927–28 ..	Do.															
1928–29 ..	17,261	32,302	51,558	112,910	48,766	13,409	126,645	99,860	3,368	11,610	..	..	48,549	2,528	21,737	37,060
1929–30 ..	697	16,747	68,430	281,949	33,525	3,907	81,856	92,052	482	..	100	400	3,805	2,004	15,771	28,752
Total ..	77,117	184,569	1,155,521	1,180,258	527,562	56,016	494,240	463,355	176,794	18,793	225,348	16,541	243,276	34,013	90,930	78,404

Year.	Buguda. Timber.	Buguda. Poles.	Buguda. Fuel.	Buguda. Bamboos.	Surada. Timber.	Surada. Poles.	Surada. Fuel.	Surada. Bamboos.	Pondakhol. Timber.	Pondakhol. Poles.	Pondakhol. Fuel.	Pondakhol. Bamboos.	Total. Timber.	Total. Poles.	Total. Fuel.	Total. Bamboos.
	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.	C.FT.	C.FT.	C.FT.	NO.
1919–20 ..	Detailed figures are not available.												204,757	133,000	505,937	Not known.
1920–21 ..	Do.												271,979	196,892	440,780	Do.
1921–22 ..	21,161	23,486	82,600	10,465	101,860	7,137	79,231	216,480	650	100	..	2,800	295,368	38,847	379,075	342,530
1922–23 ..	14,046	25,826	60,654	114,176	46,585	2,674	61,845	155,067	263	90	200	4,200	142,480	68,840	179,001	471,614
1923–24 ..	33,441	41,728	78,371	45,980	46,174	30,580	72,411	318,370	343	40	..	500	340,190	139,799	732,896	554,160
1924–25 ..	23,121	29,000	48,950	100,640	73,052	954	16,786	143,106	343	..	..	4,600	244,642	101,829	665,612	538,735
1925–26 ..	19,394	4 148	26,815	2,200	13,972	175	12,786	121,320	133	41	..	1,400	240,154	27,498	184,007	419,840
1926–27	Detailed figures, are not available.												294,000	97,000	809,237	Not known.
1927–28 ..	Do												58,600	57,000	329,255	Do.
1928–29 ..	35,972	6,066	79,642	169,170	6,635	2,781	89,587	170,593	..	20	..	2,000	160,551	68,716	369,169	591,593
1929–30 ..	16,943	1,103	68,848	103,306	7,266	14,820	44,906	349,860	119	..	1,600	5,400	62,837	38,581	281,511	861,719
Total ..	164,078	131,357	445,880	545,937	295,544	59,121	377,552	1,474,796	1,851	291	1,800	20,900	2,842,958	968,002	4,876,480	3,780,191

Section 7.—Past Revenue and Expenditure.

178. *General.*—The figures of revenue and expenditure prior to 1919–20 are taken from Mr. Minchin's Working Plan. His own description of that period may be quoted. "From 1861 onwards to 1884, figures of revenue and expenditure are on record but without classification. In the period 1861 to 1902–03, revenue amounted to Rs. 10,70,000 net. Expenditure was Rs. 10,30,000 net. Expenditure was on exploitation of the forest and on protective and exploitation staff. Nothing appreciable was spent on development of the forest property; nor was it protected effectively against fire. The finances of the period 1903–04 to 1919 with management under the Working Plans of Messrs. Cox, Cowley-Brown and Fischer are a satisfactory contrast." The figures from 1919–20 to 1929–30 relate to the period of Mr. Minchin's Working Plan and are taken from the printed Administration Reports and from the District Forest office records. It has been the custom to treat the revenue realized by the sale of the plains sal pole coupes under 'fuel.' This classification is not strictly correct. The pole coupes yield small timber or poles fit for house construction, as well as fuel. About 75 per cent of the revenue would be an appropriate receipt under 'timber' and 25 per cent under 'fuel.' Since the coupes are sold standing to contractors a meticulous classification is not possible and the existing practice may continue.

179. Summary of past Expenditure.

Year.	Exploitation.	Regeneration and tending.	Roads and bridges.	Bulidings and wells.	Fire protection.	Miscellaneous.	Establishment.	Total expenditure.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1903–04	5,770	..	324	3,360	2,871	3,363	25,509	41,197
1904–05	5,537	..	282	2,893	2,944	2,923	24,435	39,014
1905–06	6,430	..	123	1,639	2,801	5,427	28,779	45,199
1906–07	9,584	..	843	3,868	2,661	7,561	33,145	57,302
1907–08	9,632	..	917	4,881	3,074	7,635	29,929	56,068
1908–09	12,211	..	1,539	5,830	3,087	5,349	30,119	58,135
1909–10	24,506	..	2,700	9,765	2,957	10,972	35,259	86,159
1910–11	19,213	..	5,202	9,588	3,117	21,171	41,570	99,861
1911–12	16,763	..	9,041	16,406	4,573	11,999	45,599	1,04,381
1912–13	14,405	..	5,923	8,458	4,319	8,844	44,550	86,499
1913–14	15,216	..	5,889	7,381	4,136	8,624	42,036	83,282
1914–15	14,317	..	4,922	5,603	5.765	9,555	45,102	85,264
1915–16	10,647	..	4,366	5,775	5,022	9,351	47,021	82,182
1916–17	7,521	..	3,543	2,598	5,245	7,270	46,798	72,975
1917–18	9,372	..	2,941	4,061	5,389	7,342	50,648	79,753
1918–19	33,838	..	3,819	6,085	5,532	7,946	64,646	1,21,866
1919–20	20,885	285	3,503	7,544	5,297	12,549	82,281	1,32,344
1920–21	48,406	3,790	5,999	51,137	4,930	8,171	77,626	2,00,059
1921–22	49,943	5,039	13,681	53,982	6,180	2,26,526	1,18,304	4,73,655
1922–23	28,484	2,717	1,469	9,600	5,407	34,800	1,03,895	1,86,372
1923–24	40,793	1,827	2,172	8,812	5,663	6,163	1,01,851	1,67,281
1924–25	51,925	1,755	2,541	5,396	5,167	5,091	98,016	1,69,891
1925–26	29,070	1,848	3,632	11,514	5,431	19,780	89,429	1,60,704
1926–27	61,272	3,918	4,368	8,115	6,580	6,330	91,157	1,81,740
1927–28	90,149	2,948	2,775	8,178	6,361	5,328	1,03,587	2,19,326
1928–29	25,071	2,465	3,213	8,133	6,293	4,846	1,12,517	1,62,538
1929–30	955	4,934	5,018	9,857	6,366	7,546	83,999	1,18,675
Total ..	6,61,915	31,526	1,00,385	2,80,459	1,27,168	4,72,462	16,97,807	33,71,722

Exploitation.—Includes departmental exploitation under timber, firewood and charcoal, bamboos, minor forest produce, feed and upkeep of livestock, etc.

Miscellaneous.—Includes forest produce removed by private agency, comm ssion payment to permit gumastas, pay of temporary watchers, confiscated produce, purchase and repair of stores, rates and taxes, etc.

Establishment.—Includes pay and allowances of officers and establishment, contract contingencies, supplies and services, etc.

180. Summary of past Revenue.

Year.	Timber.	Fuel.	Bamboos.	Other forest prodece.	Grazing	Confiscations, fines and forfeitures.	Other m scellaneous revenue.	Total revenue.	Surplus or deficit.
	RS.	RS.	RS	RS.	RS.	RS.	RS.	RS.	RS.
1903–04 ..	13,282	5,812	5,698	3,005	11,557	650	1,052	41,056	— 141
1904–05 ..	25,699	6,169	5,371	2,369	10,687	323	707	51,325	+ 12,311
1905–06 ..	19,850	4,066	6,367	1,749	10,313	222	1,040	43,607	— 1,592
1906–07 ..	11,844	4,998	5,828	791	10,475	460	1,174	35,570	— 21,732
1907–08 ..	18,051	6,345	4,222	1,619	10,997	625	2,791	44,650	— 11,418
1908–09 ..	13,886	6,400	5,552	2,095	11,475	558	2,726	42,692	— 15,443
1909–10 ..	12,393	5,599	5,561	1,055	11,084	663	1,648	38,003	— 48,156
1910–11 ..	12,868	6,757	7,121	2,600	11,094	2,119	85	42,644	— 57,217
1911–12 ..	20,827	8,475	7,154	3,242	9,576	3,041	1,770	54,085	— 50,296
1912–13 ..	22,722	7,385	4,659	2,801	10,724	2,650	866	51,807	— 34,692
1913–14 ..	49,949	7,591	3,379	3,340	10,880	3,074	2,253	80,466	— 2,816
1914–15 ..	49,475	12,518	2,833	1,960	10,367	1,904	1,685	80,742	— 4,522
1915–16 ..	32,657	8,016	2,650	1,832	8,344	2,291	1,606	57,396	— 24,786
1916–17 ..	15,553	7,077	1,713	3,858	10,176	4,798	905	44,080	— 28,895
1917–18 ..	24,856	19,616	3,433	5,393	10,490	4,360	2,172	70,320	— 9,433
1918–19 ..	40,322	20,100	2,426	4,037	9,091	2,191	1,376	79,543	— 42,323
1919–20 ..	70,017	19,837	3,094	534	7,742	3,430	1,692	1,06,346	— 25,998
1920–21 ..	23,569	30,192	2,298	1,273	9,264	2,622	2,790	72,008	— 1,28,051
1921–22 ..	13,650	26,055	2,721	1,467	8,415	3,870	2,802	58,980	— 4,14,675
1922–23 ..	26,144	32,636	2,946	1,215	8,836	3,687	2,977	78,441	— 1,07,931
1923–24 ..	1,13,271	28,598	4,729	1,422	8,529	4,706	5,729	1,66,984	— 297
1924–25 ..	1,09,789	31,023	4,456	806	9,274	1,182	14,568	1,71,098	+ 1,207
1925–26 ..	68,439	41,055	2,937	2,716	8,873	1,198	8,392	1,33,610	— 27,094
1926–27 ..	1,03,628	48,674	6,346	4,107	8,811	679	10,028	1,82,273	+ 533
1927–28 ..	79,654	40,740	5,505	1,524	9,057	380	8,443	1,45,303	— 74,023
1928–29 ..	1,03,193	38,458	6,632	9,179	8,875	955	6,711	1,74,003	+ 11,465
1929–30 ..	62,004	35,029	6,025	2,221	9,211	1,643	8,497	1,24,630	+ 5,955
Total ..	11,57,592	5,09,221	1,21,656	68,210	2,64,217	54,281	96,485	22,70,662	— 11,00,060

Fuel.—Includes revenue from sales of Plains Sal Pole Coupes and Fuel Coupes.

CHAPTER VI.—STATISTICS OF GROWTH AND YIELD.

SECTION 1.—STATISTICS RELATING TO SAL.

181. *Mr. Minchin's statistics.*—For the purposes of his working plan, Mr. Minchin collected a great deal of silvicultural statistical material on the strength of which the system of management was founded. Experience gained in the past eleven years has not revealed any serious flaw in the system. It is considered unnecessary to reproduce from Mr. Minchin's Plan the numerous graphs relating to rate of growth and yield and they are moreover based principally on single trees and not on crops. Statistics are therefore presented in an abbreviated form in the present plan.

182. *Rate of growth yield and value of first and second quality " plains " sal.*—The tables given below are taken from Mr. Minchin's plan and show the rate of growth, yield and value of the plains sal first and second quality. The rate of girth increment and age were calculated by Mr. Minchin on the basis of annual ring counting. The averages of measurements of a number of individual trees were taken. The results were plotted in graphs from which were deduced the figures that appear in the statements. * " The trees used for the purpose were specimens that had not grown up under unfavourable circumstances. They were ordinary dominant trees. There is no occasion to make allowances on that account. The figures are intended to apply to the even aged tended crops of the future." They are not meant for sal grown as a selection forest. Mr. Minchin also published a note on the subject of annual ring enumeration in sal, in the " Indian Forester," January 1920, which may be referred to for detailed information of the methods employed by him. The chief point to be emphasized is that in Ghumsur at any rate the sal trees form fairly well defined annual rings which can be counted though with some difficulty. The statistics assembled on the basis of ring counting may be depended on for all practical purposes. The prices of timber to-day remain almost the same as they were about ten years ago. The Central Silviculturist at Dehra-Dun suggests, " further, that height development of the existing crop indicates, for the Plains Sal Working Circle, that the quality of the locality approximates the upper limit of quality 'A,' of Howard's yield table based partly on Ganjam data ; at an age of sixty years the crop diameter would thus be about 16 inches, and a proportion of the stems, in the neighbourhood of one quarter, would be 19 inches (or 5 feet girth) or over, which is considered suitable for local market conditions."

A.—Rate of growth, yield and value of plains sal, first quality.

TABLE 1.

Girth, rate of girth increment and value corresponding to ages of five years to 100 years.

Age.	Corresponding girth over bark at 4' 6".	Average annual girth increment in five-year periods.	Value.		
	INCHES.	INCHES.	RS.	A.	P.
5	7	1·3	..		
10	13	1·2	..		
15	19	1·2	..		
20	25	1·2	1	8	0
25	31	1·2	..		
30	37	1·2	4	4	0
35	42	1·0	..		
40	47	1·0	9	8	0
45	52	1·0	..		
50	55½	0·7	* 16	0	0
55	58½	0·6	..		
60	61⅓	0·56	23	8	0
65	63	0·46	..		
70	65⅔	0·40	31	0	0
75	68	0·48	..		
80	69¼	0·25	38	0	0
85	70½	0·25	..		
90	71	0·10	40	0	0
95	71⅙	0·10	..		
100	72	0·10	42	0	0

TABLE 2.

Age, height, yield and value corresponding to girths of 6 inches to 6 feet.

Girth over bark at 4' 6".	Corresponding age.	Height.	Yield ; volume in solid cubic feet. Approximate. Poles.	Billets and brush-wood.	Stem-wood without bark, rough squared logs.	Total yield.	Value.		
	YEARS.	FEET.	C.FT.	C.FT.	C.FT.	C.FT.	RS.	A.	P.
0' 6"	4½	17½	..	..	..	0·15	..		
1' 0"	12	36	..	..	..	1·15	..		
1' 6"	14	52	..	..	..	4·00	0	8	0
2' 0"	19	63	..	..	..	7·75	1	4	0
2' 6"	24	72	..	..	..	14·60	2	8	0
3' 0"	29	81		..	..	24·00	4	2	0
3' 6"	35	87	..	..	..	35·50	6	12	0
4 0"	41	93	5·5	20·0	22·5	48·0	* 9	12	0
4' 6"	48	97½	8·0	25·0	28·5	61·5	13	8	0
5' 0"	58	101	8·5	30·5	35·75	74·75	21	0	0
5' 6"	70½	104	8·5	37·0	43·75	89·25	31	0	0
6' 0"	100	106	8·5	46·0	54·75	109·25	42	0	0

* NOTE.—Below 4' in girth the values are for the whole tree, timber, poles or fuel. For 4' in girth and upwards, the value given refers to timber only ; the value of crown wood varies from nothing up to Re. 1 per tree, according to situation.

B.—Rate of growth, yield and value of plains sal, second quality.

TABLE 1.

Girth, rate of girth increment and value corresponding to ages of five years to 100 years.

Age.	Corresponding girth over bark at 4′ 6″.	Average annual girth increment in five-year period.	Value.
	INCHES.	INCHES.	RS. A. P.
5	5	1·0	..
10	10	1·0	..
15	15	1·0	..
20	20	1·0	0 12 0
25	25	1·0	..
30	29¾	0·95	2 8 0
35	34¼	0·9	..
40	38	0·75	5 0 0
45	41¾	0·75	..
50	45	0·65	7 12 0
55	48	0·6	..
60	51	0·6	10 12 0
65	53½	0·45	..
70	55½	0·45	13 8 0
75	57¼	0·35	..
80	59	0·35	17 0 0
85	60½	0·30	..
90	61¾	0·25	20 0 0
95	62½	0·15	..
100	63	0·10	21 0 0

TABLE 2.

Ages, height, yield and value corresponding to girths of 6″ to 5′.

Girth over bark at 4′ 6″.	Corresponding age.	Height.	Yield ; volume in solid cubic feet. Approximate. Poles.	Billets and brush-wood.	Stem-wood without bark, rough squared logs.	Total yield.	Value.
	YEARS.	FEET.	C.FT	C.FT.	C.FT.	C.FT.	RS. A. P.
0′ 6″	6	16	..	..	..	0·15	..
1′ 0″	12	32	..	..	..	1·15	..
1′ 6″	18	45	..	..	..	4·00	0 8 0
2′ 0″	24	56	..	..	..	7·75	1 4 0
2′ 6″	30¼	62	..	..	..	14·60	2 8 0
3′ 0″	37	68	..	..	..	24·00	4 2 0
3′ 6″	45	72	..	..	..	34·00	6 8 0
4′ 0″	55	76	5·5	18·0	19·5	43·00	8 8 0
4′ 6″	67	79	8·0	22·0	23·5	53·50	10 8
5′ 0″	83	82	8·0	28·5	26·0	62·50	17 8

183. *Rate of growth of third quality plains sal.*—The tables given below show the rate of growth of sal coppice in third quality localities. The method of compiling these figures may be described in Mr. Minchin's own words. "The statistics used in obtaining these figures in the case of Tables (1) and (2) were from coupes all over Ghumsur. They are based on averages of stems growing single, in unthinned coupes. When thinning has been done the rate of growth will perhaps exceed the rates given. The figures of volume increment, Table (3) are based on results in one felling series only, the Kontaipalli coupes near Russellkonda ; there is, however, nothing unusual about this series." At the time of preparing these statistics the oldest coupes were only 15 years. Figures from 15 years old and upwards were obtained from the graph by continuation of the curve.

Rate of growth, yield of plains sal, third quality.

TABLE 1.

Rate of height and girth growth.

Age.	Corresponding height.	Corresponding girth.
	FEET.	INCHES.
5	25	6·25
10	38·5	10·0
5	51·0	13·5
20	60·75	16·75
25	69·25	20·0

TABLE 2.

Age and volume corresponding to certain girths.

Girth.	Age to attain different girths.	Volume.
INCHES.	YEARS.	C.FT.
6	4·75	0·45
12	13·0	1·5
18	22·0	4·0
24	31·3	7·75
30	40·0	14·6

TABLE 3.

Rate of volume increment per acre.

Age.	Volume in solid cubic feet.	Current increment.	Mean annual increment.
1	Not ascertained.		
2			
3			
4	398	99·5	78
5	460	92·0	62
6	527	87·8	67
7	600	85·7	73
8	664	83·0	64
9	727	80·7	63
10	780	78·0	53
11	830	75·4	50
12	880	73·3	50
13	920	70·7	40
14	960	68·6	40
15	990	66·0	30
16	1,020	63·7	30
17	1,048	61·6	28
18	1,074	58·8	26
19	1,098	57·7	24
20	1,120	56·0	22
21	1,140	54·2	20
22	1,155	52·5	15
23	1,172	50·9	
24	1,190	49·5	
25	1,210	48·4	

184. *Rate of growth of hill-side sal.*—In the following statement is given the rate of growth of good hill-side sal, taken from Mr. Minchin's plan. This is the slowest grown of the several types of sal and is ususally met with in the mixed hill forests :—

Rate of growth of Ghumsur hill-side sal.

TABLE 1.

Girth and rate of girth increment corresponding to ages of 5 to 145 years.

Age.	Girth over bark at 4′ 6″.	Average annual girth increment in periods of five years.
5	0′ 4″	0·8
10	0′ 8″	0·8
15	1′ 0″	0·8
20	1′ 3″	0·6
25	1′ 7″	0·8
30	1′ 11″	0·8
35	2′ 3″	0·8
40	2′ 7″	0·8
45	2′ 10″	0·6
50	3′ 2″	0·8
55	3′ 5″	0·6
60	3′ 8″	0·6
65	4′ 0″	0·8
70	4′ 3″	0·6
75	4′ 6″	0·6
80	4′ 9″	0·6
85	5′ 0″	0·6
90	5′ 2″	0·4
95	5′ 5″	0·6
100	5′ 7″	0·4
105	5′ 10″	0·6
110	6′ 0″	0·4
115	6′ 2″	0·4
120	6′ 4″	0·4
125	6′ 6″	0·4
130	6′ 7″	0·2
135	6′ 9″	0·4
140	6′ 10″	0·2
145	0. 11″	0·2

TABLE 2.

Age corresponding to girths of 6″ to 7′.

Girth over bark at 4′ 6″.	Age.
6″	8
1′ 0″	15
1′ 6″	23
2′ 0″	31
2′ 6″	39
3′ 0″	47
3′ 6″	56
4′ 0″	65
4′ 6″	75
5′ 0″	85
5′ 6″	97
6′ 0″	110
6′ 6″	126
7′ 0″	148

185. *Permanent sample plots.*—For the compilation of clear-felled sal yield tables, the Forest Research Institute, Dehra Dun laid out ten permanent sample plots in January and February 1925 in the following localities :—

(1) Plains Sal Pole Working Circle, Kaliamba Reserve, Kontaipalli Series, Coupe XVI (revised No. XVII-a).

(2) Plains Sal Timber Working Circle, Chandragiri Reserve, Coupe I.

(3) Plains Sal Timber Working Circle, Chandragiri Reserve, Sappakholo Block, Compartment 10 (revised No. 18).

(4) Plains Sal Timber Working Circle, Chandragiri Reserve, Sappakholo Block, Compartment 14 (revised No. 18).

(5) Plains Sal Pole Working Circle, Kullada Reserve, Kullada Series, Coupe I.

(6) Plains Sal Pole Working Circle, Kullada Reserve, Kullada Series, Coupe II.

(7) Plains Sal Timber Working Circle, Galleri Reserve, Danguapalli Block, Compartment 14 (revised Miniari Block, Compartment 24).

(8) Plains Sal Pole Working Circle, Kullada Reserve, Kullada Series, Coupe VII.

(9) Plains Sal Pole Working Circle, Tiliki Reserve, Gundribadi Series, Coupe I.

(10) Plains Sal Pole Working Circle, Tiliki Reserve, Gundribadi Series, Coupe XII.

The upkeep and measurement of the plots are entrusted to the Forest Research Officer, Ootacamund, and it is essential that they be measured at intervals of five years ; no measurement has, however, been made in January-February 1930 when it was due, owing to the insufficient allotment of travelling allowance to the Forest Research Officer. It is now being made in January-February 1931 by the District Forest Officer.

Section 2.—Statistics relating to Species other than Sal.

186. *Indigenous species.*—Very little information is available of the rate of growth of species other than sal. The following observations on some of the species were made by Mr. Minchin and recorded in his working plan with the caution that they must not be taken to be at all exact since as with sal there is a wide range of quality of each species.

" *Pterocarpus marsupium* is able apparently to grow in height at the same rate as adjoining sal that have forced it up, but its rate of girth increment is in such circumstances appreciably slower than that of the adjoining sal. Free grown specimens that have been examined, however, appeared to have much the same rate of girth increment as sal of the second quality without attaining the same height growth. Length of bole depends mainly on the propinquity of other tree growth. The bole is normally about three-fourth of the length to be expected from sal of the same girth.

Adina cordifolia does not keep pace with adjoining sal in point of height growth. In its own localities—southerly aspects very often—the best *Adina cordifolia* grows to 90 feet in height with stems sound up to 7 feet in girth (including very marked buttresses however). Rate of girth increment of some specimens growing on the skirts of the ghauts below Jittaghati was approximately the same as hill-side sal, 5 feet 6 inches to 6 feet in girth in 100 years. It must be said that ring counting with *Adina cordifolia* was more difficult than with sal and that these results cannot be trusted until more research has been done. Very liable to branching from 25 feet above the ground but the trunk up to 40 feet yields useful timber generally.

Anogeissus latifolia.—Ring counting very difficult and no other means of judging age and rate of growth available. Large free grown specimens of *Anogeissus latifolia* 6 feet in girth and thereabouts that have been examined had discoloration at the centre which obscured the early rings. Rings in the last 4 inches of radius, inwards from the bark, give an annual girth increment rate of 0·65 inches per annum. Growth before middle age is faster and the age of a 5-foot tree may therefore be from 80 to 90 years."

187. *Exotic species—Teak.*—Of the species not natural to Ghumsur teak has been introduced on an experimental scale. There are two small teak plantations of known ages raised artificially in Coupes I and II of the Ravine Working Circle in the years 1920 and 1921, respectively. The 1920 plantation having an area of about 4 acres received a severe set back from the fire of 1923 which necessitated the cutting back of the teak to ground level in the following year. The new crop of Coupe I would therefore date from 1924 and is growing up well but no measurements of stems have been taken. The plantation in Coupe II has grown under less unfavourable conditions although proper tending was denied to it in the early years. The present area is about one acre. Individual trees show exceedingly good rate of growth. In order to test the quality of teak, twelve stems more or less dominant and free growing were selected by the Working Plans Officer and measured in March 1929 when the plantation was about eight years old. The girths were measured at 4 feet 6 inches from the ground and the heights were taken by stretching a bamboo up to the tip of the leading shoots. The results are expressed below :—

Tree number.	Girth at 4′ 6″.	Height in feet and inches.	
A-1	16¾″	42′ 6″	Has 3 leaders.
A-2	14¾″	43′ 6″	
A-3	14½″	41′ 4″	
A-4	15¼″	39′ 6″	
A-5	13½″	42′ 10″	
A-6	14″	40′ 8″	

Tree number.	Girth at 4′ 6″.	Height in feet and inches.	
A-7	15″	43′ 7″	
A-8	16″	45′ 0″	
A-9	13½″	38′ 10″	
A-10	12½″	38′ 9″	Trees 10 and 11 are 5′ 8″ apart.
A-11	12½″	37′ 1″	Trees 10 and 11 are 5′ 8″ apart.
A-12	15¾″	40′ 3″	Has 2 leaders.

For an age of eight years the trees show girths varying from 13 to 17 inches and heights varying from 39 to 45 feet, a satisfactory rate of growth. The further progress of these trees is worth watching. Crosses and numbers have been painted on the trees and the plantation will also be laid down as an observation plot, requiring remeasurement every five years.

CHAPTER VII.—ESTIMATE OF CAPITAL VALUE OF THE FOREST.

188. *Capital value of the forest.*—The records available do not furnish sufficient data to calculate the capital value of the Ghumsur forests. Hence no attempt is made to estimate the capital value.

PART II.

Future Management discussed and prescribed.

CHAPTER I.—BASIS OF PROPOSALS.

189. *General objects of management.*—The main objects of management are:—

(1) to provide for the interests and needs of the local population.

(2) to improve the forest by the silvicultural treatment of the present crop and by protection against injuries;

(3) to maintain and increase the productivity of the soil.

(4) to aim at a sustained yield and to obtain the highest possible net return per acre per annum in perpetuity.

(5) to prevent erosion and regulate the water supply, and

(6) to preserve the wild fauna of the forest.

190. *Methods of treatment to be adopted.*—The irregular natural forest of the plains sal first and second quality as well as of the ravine sal forest will be converted to regular even aged crops by clear-felling, followed by natural regeneration from cut-back sal advance growth. In the ravine sal forest, limited areas will be chosen for the raising of teak and *Gmelina* by artificial means. The plains sal third quality forest the minor hill forest, the scrub jungle and the relatively better parts of the broken ground forest will be worked under the simple coppice system. The mixed hill forests and other suitable areas will be worked under the selection system. The crops derived from clear-fellings of the plains first and second quality sal, as well as the ravine sal and from coppice fellings of the plains third quality sal will be specially tended according to their silvicultural needs. Grazing will be regulated wherever necessary and every endeavour will be made to exclude fires. Forest offences will be controlled by a system of organized patrol.

191. *Working circles, their area and distribution, reasons for their constitution.*—In Mr. Minchin's working plan seven working circles were formed. Two of these relating to fuel will now be amalgamated into one working circle for convenience (vide paragraph 161 of Part I) and two additional working circles dealing with minor produce and grazing will be formed. The eight working circles of the present working plan will therefore be as follows :—

(i) *Plains Sal Timber Working Circle.*—Area 11,055 acres. This working circle includes the plains sal forest of qualities I and II. Of the total area, 2,003 acres have already been converted to even aged sal crops dating from 1920 to 1930. The rotation is 60 years and there are two felling series.

(ii) *Ravine Working Circle.*—Area 6,425 acres. To this working circle belongs the ravine sal forests of which 605 acres have been felled and regenerated from 1920–21 to 1929–30. The coupes contain considerable areas covered with miscellaneous species and bamboos. In Coupes I and II there are small experimental plantations of teak and *Gmelina arborea*. The unworked forest of 5,820 acres have been remapped for this Revised Plan. The rotation is 80 years and it is now proposed to form two felling series.

(iii) *Plains Sal Pole Working Circle.*—Area 40,786 acres. This deals with the third quality sal forest of the plains. Of the total area, 10,472 acres are coppice coupes of 1903–04 to 1929–30. The coupes contain varying proportions of non-sal and broken ground which have in the course of the preparation of this working plan been separated by stock-mapping. The rest of the natural forest has been restock-mapped in detail with the exception of a small area in remote reserves that cannot at present be worked. The old rotation of 25 years will be raised to 40 years and it is proposed to constitute 23 felling series.

(iv) *Selection Working Circle.*—Area 2,46,551 acres. The Selection Circle comprises 1,59,194 acres of mixed hill forest, 71,667 acres of plains broken ground and 15,690 acres of unfelled third quality sal occurring in those reserves which contain the mixed hill forest. Fellings will be regulated by fixing the exploitable girth ; each range is to form a separate felling series. The felling cycle will be 20 years.

(v) *Fuel Working Circle.*—Area 98,389 acres. This includes 51,170 acres of minor hill forest, 8,150 acres of scrub jungle, 39,031 acres of plains broken ground occurring in those reserves that are not allotted to the Selection Circle, and also 38 acres worked for fuel on the slopes of the mixed hill forest. The rotation will be 25 years and there will be 15 felling series.

(vi) *Bamboo Working Circle.*—Area 79,792 acres. The Bamboo Circle embraces the bamboo bearing areas that are definitely allotted to felling series according to the present demand. The rotation varies from 3 to 5 years and there will be 23 felling series. If fresh demand springs up (which is unlikely in the next 10 years) it is possible to constitute additional series elsewhere and thereby expand the area of the working circle.

(vii) *Minor Produce Working Circle.*—This working circle includes the whole working plan area.

(viii) *Grazing Working Circle.*—This circle covers the whole working plan area excluding the plains 'sal blocks' and the worked coupes of the Plains Sal Timber, Pole and Ravine Working Circles and any other areas which need special closure to grazing. The fuel coupes will be temporarily closed to grazing for the first five year.st

192. *Period of working plan and necessity for intermediate revision.*—The working plan covers a period of ten years from 1st April 1930 to 31st March 1940. If any of the prescriptions laid down herein are found impracticable, deviations will have to be sanctioned under proper authority ; no departure from the prescribed working is to take place without such sanction ; considerable confusion has arisen in recent years owing to neglect of this rule. Revision should be taken in hand two years in advance of the expiry of the present plan.

CHAPTER II.—WORKING PLAN FOR THE PLAINS SAL TIMBER WORKING CIRCLE.

SECTION I.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF THE VEGETATION.

193. *Area.*—The Plains Sal Timber Working Circle covers an area of 11,055 acres distributed among all the seven ranges of Ghumsur.

194. *General constitution.*—The plains sal forests of first and second qualities are allotted to this working circle. The first quality sal covers 279 acres and the second quality, 10,776 acres. Of the total area, 2,003 acres have been clear-felled and regenerated with sal from 1919–20 to 1929–30. The remaining 9,052 acres form the natural forests which await similar conversion.

195. *General character of the vegetation.*—In the young uniform crops as well as in the natural forest sal is the principal tree. Inferior species form mixtures of varying degrees and they appear in conspicuous numbers in the young crops rather than in the natural forest. Bamboo is present to some extent on the margins of the hills and stream banks. Nevertheless, for all practical purposes the forest is pure sal. Amongst the undergrowth, sal advance growth is usually abundant. The composition and condition of the forest have already been discussed in Part II, Chapter II.

SECTION 2.—DIVISION OF THE AREA.

196. *Blocks.*—The forests of this working circle are distributed among blocks known by local names. The limits of the blocks are (with few exceptions) demarcated and fire traced and they include forests of other working circles. In some cases two adjacent blocks have naturally merged into one another through the disappearance of the internal lines ; for such blocks the

more popular name has now been adopted. Some of the other block names have had to be revised in accordance with modern usage. The whole of this working circle is closed to grazing.

197. *Compartments.*—According to Mr. Minchin's mapping, numerous compartments were formed on the basis of the relatively mature and young woods of the first and second qualities. This distinction will no longer be kept up for the reasons explained in paragraph 141 of Part I. Each compact area of first or second quality sal forest will now be distinguished as a compartment. The compartments are now serially numbered in Arabic characters in each reserve and shown on the maps. The first quality sal is tinted green and the second quality sal is tinted yellow. The boundaries of most of the compartments are not cut on the ground but one can generally distinguish their limits from the quality of the forest. The boundaries will be cut as the coupes are worked. Worked coupes are denoted by Roman numbers and the year of working. A list of coupes and compartments occurring in each reserve will appear in Appendix V.

198. *Felling Series.*—In accordance with the procedure also adopted in the last plan, two felling series are now constituted. Series I consists of the first and second quality sal forests situated in the northern ranges, namely, Russellkonda, Mojjagoda, Kukuluba and Bontha. Its area is 8,336 acres which is made up of 1,555 acres of regenerated coupes (191 acres first quality and 1,364 acres second quality) and 6,781 acres of unworked forest (62 acres first quality and 6,719 acres second quality). Series II includes the first and second quality sal forests of the southern ranges, namely Buguda, Surada and Pondakhol. Its area is 2,719 acres consisting of 448 acres of regenerated coupes (22 acres of first quality and 426 acres second quality) and 2,271 acres of unworked forest (4 acres first quality and 2,267 acres second quality). The main considerations which favour the formation of two series are the separate situtation of the forests in relation to the local markets and the distribution of the available staff and labour.

Section 3.—Analysis and Valuation of the Cash.

199. *Stock-mapping.*—Mr. Minchin's mapping of the first and second quality sal forest has been accepted for the present plan. Where such areas have been cut over and regenerated, the differences between the two qualities are not now apparent in the young crops. Since the treatment of the first and second quality sal is identical a revision of the quality classes as applied to the young crops is not necessary at the present time. It may have to be undertaken eventually with a view to prepare correct yield tables. At the close of his mapping of the forests Mr. Minchin recognized that the separation of the III quality sal from the first and second qualities was carried out too rigidly for practical purposes. He therefore suggested the tacking of small third quality areas on to the I and II quality sal when the coupes were actually laid out. This practice has been followed in the past and may be continued in the future. Some compartments originally belonging to the Ravine Working Circle have now been transferred to the Plains Sal Timber Circle. They are classed as II quality forest for convenience although it is possible to discover small first quality areas in them.

200. *Valuation of the crop.*—Mr. Minchin's calculations of the value of sal trees in 5-year age classes have already been given in Part I, Chapter V. According to his tables, first quality sal is expected to fetch Rs. 23–8–0 per tree at an age of 60 years and second quality sal, Rs. 10–12–0. The prices are only of theoretical interest. Under the dual system of exploitation of the standing crops carried out in the past, it has not been possible to arrive at the correct figures of the real sale value of the forest. Sales of standing growth in the past have brought in prices varying from Rs. 5 to Rs. 99 per acre. The prices are dependent on accessibility and the volume of mature timber present in the forest. From areas that will be allotted in the next period, a considerable volume of big timber has already been removed for the saw mill. Such crops

will have a low sale value. The system of exploitation is likely to be through the agency of contractors. In view of this it has not been thought necessary to undertake detailed enumerations and valuation surveys.

SECTION 4.—METHOD OF TREATMENT—FELLING SERIES I AND II.

201. *Choice of species.*—Sal will be the species chosen for regeneration in Felling Series I and II. Regeneration from switch growth is always to be preferred to regeneration from coppice; where sal is deficient or absent, the species to be favoured next in the order of importance are *Pterocarpus marsupium, Adina cordifolia* and *Terminalia tomentosa.*

202. *Silvicultural system.*—This working circle will be treated under the high forest clear-felling system with natural regeneration from sal advance growth.

203. *Rotation.*—From his analysis of the crop and rate of growth, Mr. Minchin found that mature salt trees of above 5 feet in girth in the first quality and 4 feet 3 inches in girth in the second quality, were liable to unsoundness and were also putting on increment slowly. He therefore calculated the physical rotation corresponding to these sizes to be about 60 years which he adopted for both qualities. The large scale exploitation carried out during the past decade has more than confirmed the wide spread prevalence of unsoundness in the Gumsur sal. Nevertheless the rate of growth as well as the quality of the young uniform crops established since 1920 are observed to be superior by several degrees to what they were expected to be. There seems to be every possibility of growing sound healthy crop of over 5 feet in girth in the first quality and 4 feet 3 inches in girth in the second quality. Whether it will eventually prove to be economical to lengthen the rotation is uncertain. At the present moment there appears to be no case for any alteration and the rotation of 60 years will be adhered to. But it is at all events possible that the rate of growth has been over estimated and the matter must be carefully reconsidered at the first revision of the plan when better data should be available.

204. *Periodic blocks.*—In the last plan, the forests in each felling series were divided into four periodic blocks, each block being equivalent to the area of 15 annual coupes. The periodic block system of the 1919 plan has served its purpose. It assisted in prescribing the comparatively mature areas for clear-felling and natural regeneration during the first period and indicated the coupes to be taken up in the second period and also the areas for the extraction of mature trees and for improvement fellings. The mature forest has now to a great extent been clear-felled and formed into young crops. The subsidiary fellings will not be resumed in this period for the reasons explained in paragraph 148 of Part I. The operations will be concentrated in the annual clear-felling coupes for which a simple programme of fellings is all that is necessary. The periodic block system will therefore be discontinued temporarily.

At the next revision, however, the whole position should be reviewed and the advisability considered of reconstituting the periodic blocks and harvesting the mature trees as well as executing improvement fellings in the forests which are not allotted for clear-fellings.

205. *Regulation of the yield.*—During the period of conversion of the irregular high forests into uniform crops, the simplest method of regulating the yield will be by area. The size of the annual coupe is obtained by dividing the area by the rotation. In Felling Series I the annual coupe will be 8,336 acres ÷ 60 = 139 acres. The annual coupe in Felling Series II will be 2,719 acres ÷ 60 = 45 acres. Calculating from the actual figures of yield obtained from Coupes I to IX, the average yield of saleable timber resulting from the extraction of 3 feet 3 inches girth trees is expected to be 220 cubic feet per acre in Series I and 110 cubic feet per acre in Series II. In applying these figures to areas in which subsidiary fellings have already taken place, it is estimated that a deduction of at least 50 per cent will have to be made.

206. *Laying out the annual coupe.*—The compartments prescribed for clear-fellings will be laid out on the ground with reference to the stock map. The limits of each compartment shall be selected and marked under the personal supervision of the District Forest Officer and subsequently demarcated. Judging from the nature of the soil and the quality of the growth the District Forest Officer will be able to select the maximum extent of the first and second quality sal and avoid III quality. The first and second qualities are usually indicated by prolific sal advance growth. Provided the desired type of forest is chosen, the stock-map need not be rigidly adhered to. The perimeter of the coupes shall then be cleared to a width of 10 feet (This width will be enlarged to 15 feet in the following year, for purposes of fire protection, vide paragraph 225 below).

207. *Survey of the coupe.*—The coupes shall be correctly surveyed by an Officer not below the rank of a ranger. The survey will be completed in the cold weather not later than the month of December. The area of individual coupes will be rounded off to the nearest acre.

208. *Clear-felling.*—The mode of executing the fellings will be left to the discretion of the District Forest Officer. The present method of selling the standing coupes to contractors has been successful in the past and should probably continue in the future. The great advantage of this method is that the staff will be freed from the responsibility of exploitation, stock-taking and disposal of the produce, maintenance of accounts, etc., and their attention directed instead to the important silvicultural works. If the coupes are to be sold to contractors the sales should be held in January. The contractor may be granted a " voidah " of one year commencing from the 1st of February. Before a contractor is permitted to fell an area, the trees along the outer edge of the coupe line shall be hammer-marked at intervals of about one chain with the Range Officer's seal hammer, in order to safeguard against encroachments. Everything in the coupe shall be felled. The contractor may be encourged to remove as much produce as possible with a view to minimize the departmental labour involved in burning the refuse from fellings. On no account shall fellings or removals be permitted to extend beyond the 15th of February as the growing season of sal commences then.

209. *Burning the felling debris.*—Regeneration operations will definitely commence on the 1st of February. First, the felling debris shall be completely burnt to ash. In most coupes there is usually a considerable amount of unsaleable wood lying scattered all over the area. The object of the burning is to destroy this debris and thereby (*a*) to leave the ground free for the new sal shoots to come up, (*b*) to eliminate the danger from future fires and (*c*) to control the insect and fungoid pests which would otherwise breed in the abandoned logs and branch wood. A ground fire shall be lighted which will consume a large quantity of waste material. The unburnt logs shall then be cut, heaped up at selected places (usually those deficient in sal regeneration) and burnt to ash.

210. *Cutting back sal advance growth.*—All sal advance growth in the switch or seedling stage shall be cut back nearly flush with the ground at a height of not more than 3 inches. Old advance growth is often crooked, suppressed or diseased. The object of cutting this back is to stimulate the growth of straight, vigorous and healthy shoots from below the ground level. The dormant buds which produce the new shoots are situated immediately below the surface of the ground. For this reason the advance growth shall not be hacked in a manner leading to the injury of the root stock but will be cut with a sharp knife at a height of not more than 3 inches above ground. The cutting back should immediately follow the burning, before fresh regrowth springs up from the burnt back switches. The cutting back may therefore commence while the burning is in its last stages. All regeneration operations shall be carried out expeditiously and shall be completed if possible by the end of February and in any case not later than the 15th of March.

211. *First year cleaning.*—The object of the early cleanings, now to be described, is to encourage sal against any other interfering species, with a view to produce the maximum degree of stocking. Assuming that the regeneration

operations are completed in March, the new crop springs up almost at once and may be said to date from this month. Clumps of sal shoots numbering up to 9 or 10 are produced by each root stock. By the ensuing October, the whole area of the coupe becomes a dense impenetrable mass of sal shoots, regrowth of other tree species, coarse grass (*Setaria glauca* or chono) weeds and climbers. A herbaceous growth *Urena lobata* with spiny fruits also appears in large numbers. The most prominent climber is wild gram (bono kulthi) which spreads in cushion-like masses. A cleaning shall be carried out in October-November and shall consist of :—

(1) Cutting back of grass, weeds, nonsal species and climbers.

(2) Removal of the obvious "Coppice" sal (or 'Wolves'), which arise from an old stump at or above the ground level. 'Coppice' sal may be left only in blanks or areas where there is no sal growth of switch origin.

(3) Reduction of clumps of sal shoots at each root stock to one good stem, except in the case of small switchy growth which is unable to grow erect by itself.

(4) No attempt will be made at spacing the individual sal stems. In the execution of cleaning, care shall be taken to ensure that the stems left for retention are not injured in any manner whatsoever. A sharp look-out must be kept for the climber *Mucuna pruriens* (Baidango) and wherever it appears it must be cut out, preferably in September, before the fruits are formed. Otherwise the hairy pods cause intense irritation to the coolies and render the cleaning work difficult and tiresome.

212. *Second year cleaning.*—In the second year the fast grown non-sal species like *Grewia, Kydia, Phyllanthus*, etc., may be seen to overtop sal, and climbers too are a great menace. A second year cleaning is as essential as the first and shall be carried out in a similar manner in October-November when the crop is about 1 year and 8 months old.

213. *Fourth year climber-cutting.*—The first and second cleanings will have freed the sal saplings from interference by weeds and non-sal species. In subsequent years, climbers continue to grow up and if left alone would strangle the sappy stems and twist the leading shoots. A climber-cutting shall therefore be done in the fourth year, in October-November when the crop is aged about 3 years and 8 months. Certain climbers have the habit of attaching themselves to sal stems at a height of four or five feet above ground. Such climbers are not always observed by the coolies unless they happen to look up. Moreover the coolies are inclined to cut climbers against the surface of the sal stems and thereby cause wounds which may allow ingress of wood-rotting fungi. The climbers must be pulled out by hand and cut away from the stem with a sharp knife. The climber-cutting requires some supervision therefore.

In the course of climber cutting, coppice sal which takes off from a visible stump and non-sal species overtopping sal shall also be cut. Bamboo regrowth wherever found will be cut at any time and as often as is necessary at the discretion of the District Forest Officer. There may be cases in which parts of a crop need a regular cleaning instead of a mere climber cutting. It will be for the local staff to bring such cases to the notice of the District Forest Officer and obtain his orders.

214. *Eighth year thinning.*—In the three years following the climber-cutting, sal may be left to take care of itself. In the eighth year of life, we may expect to have a fully stocked crop in which sal originating from 'switches' predominates. Much of the crop will consist of sal in dense thickets with the crowns pressing against one another. At this stage the soft stems have commenced to acquire rigidity through the formation of a rough, corrugated bark. In other words, the sapling is emerging into the pole stage. The crop is thus ready for thinning. After the rains have subsided, a thinning shall be executed in December-January when the crop is about seven years and 9 months old. Thinning shall on no account be made in wet weather when the crowns are heavy and bending is likely to result. The following rules will be observed during thinning—

(1) Thinning shall be done in accordance with ordinary silvicultural principles bearing in mind that the next thinning is to follow five years hence.

(2) Being the first thinning the crop shall not be opened out very heavily. If the stems are spaced too widely apart, bending may follow in the ensuing monsoon weather. It is desirable to give the crowns sufficient room for expansion in the next five years but no more. It should be borne in mind that sal in its early youth has a slender candle-flame shaped crown, which needs little space in the upper leaf canopy. We have not as yet acquired sufficient knowledge to prescribe any absolute spacing. It is believed that a spacing of 6′ × 6′ will be about correct in which case the number of stems that will stand per acre is 1,210.

(3) Climbers shall be cut in advance of thinning. The climbers should be severed from the crowns by some device such as a bill-hook tied to the end of a pole. If this is not done, the stems for retention will have their crowns pulled down and bending may result.

(4) Sal of switch origin and free from injury shall be definitely favoured against coppice stems, for retention. The former arises from below the ground and has a slender crown of candle-flame shape. But the coppice sal even if it apparently springs from below the ground can be recognized by its branchy crown and unusual height growth. At first sight these coppice stems may appear to the subordinates and coolies to be the best stems on account of their size. Nothing but persistence by the District Forest Officer will cure the staff of their tendency to select such stems for retention.

(5) Non-sal species interfering with or likely to interfere with sal shall be cut down. Where sal of switch origin is deficient, coppice sal and other species like *Pterocarpus marsupium*, *Adina cordifolia* and *Terminalia tomentosa* shall be kept in order to preserve ground cover.

(6) In the course of thinning, side branches of sal shall not be trimmed on any account. Unless the coolies are specially warned against it they are in the habit of shaving off the lower branches for 'effect' and injuring the stems.

(7) All thorny undergrowth shall be cut out and the stumps splintered. The other undergrowth species will be cut only to the extent necessary to enable men to move about the area.

(8) Thinning shall be carried out under the immediate and personal supervision of a forest officer not below the rank of a forester and such foresters or Rangers will have to be taught the work by the District Forest Officer himself at the outset.

215. *Thirteenth year thinning.*—In the thirteenth year of life, the second thinning shall be carried out in December-January when the crop is aged about 12 years and 9 months. The following rules will be observed :—

(1) Thinning shall be executed according to ordinary silvicultural principles.

(2) All climbers shall be cut in advance of thinning removing a length from the stem and splintering the stumps.

(3) Sal of switch origin shall be favoured against sal of coppice origin. It is necessary to give the sal crowns adequate growing space in the upper storey. No definite espacement is prescribed.

(4) Non-sal species interfering with or likely to interfere with sal shall be cut down. Coppice sal and non-sal species will be retained only in areas which would otherwise be blanks, in order to cover the ground.

(5) All thorny undergrowth shall be cut and the stumps splintered. Other undergrowth species should not be cut.

(6) Marking shall be done by the Range Officer and the thinning shall be executed under the personal supervision of a forest officer not below the rank of a forester. The District Forest Officer shall himself mark as big an area as he possibly can in any case not less than 10 per cent and shall also teach his subordinates the correct thinning practice.

In accessible places it may be possible to dispose of the materials resulting from the thirteenth year thinning and attempts should be made to sell the thinned produce.

216. *Further thinning.*—It seems unlikely that the next thinning will take place within as short an interval as five years. The oldest crop will at the end of the period of the present working plan have reached an age of 19 years and it will have passed through an interval of six years from the thirteenth year thinning. For the present it seems best to leave the question of further thinning for consideration at the next revision of the working plan.

217. *Special tending of crops browsed upon by deer and bison.*—Browsing of a serious kind is liable to take place in the first and second year crops in localities where the coupes are small and remotely situated, and where the tiger is scarce and bison or deer abound. Such areas require special watching by the local staff. In the instances that came to notice in Kriamba reserve in the early part of 1930, the browsing and the breaking of sal saplings had taken place after the crops were opened up in the first and second year cleanings. The breaking of leaders at a height of three or four feet above ground is the worst form of damage and if the broken stems are left to themselves they are almost certain to grow up unsound if our experience of the susceptibility of sal to unsoundness is any guide. The evidence available goes to show that an area does not attract deer or bison when it is in the state of a dense thicket and that the browsing takes place in the dry weather after the sal is exposed by cleanings. In other words the changes of recurrent browsing can be minimized by maintaining the crop in the state of a dense thicket. Where browsing is expected to take place particularly in Kriamba reserve, the coupes shall be inspected periodically by the Range Officer after the first or second year cleaning is made and the browsing incidence should be reported to the District Forest Officer. In the ensuing monsoon preferably at the beginning of July the broken sal saplings shall be cut back near the ground level. The damaged areas shall then be left to grow up untouched until the age of about five years. During the fifth year, a climber cutting and a light cleaning shall be made to assist the sal against other species. The crop shall then be thinned in the usual manner during the eighth year of its life unless the District Forest Officer, after personal inspection considers it advisable to postpone the thinning to a later date.

218. *Subsidiary tending, climber cutting in the natural forest.*—In the first and second quality natural forest that is not allotted for clear-felling during the next ten years, one climber-cutting shall be executed during the period of the present working plan. It is desirable to get through the climber-cutting as rapidly as the staff can cope with it. For this purpose the coupes in each range will be allotted so as to give each range an area of about 300 acres a year. Climbers shall be cut at two points, one foot and four feet above ground. The operation shall be executed in the rainy months of July-August when the staff is not busy with other silvicultural works. When the whole forest has been worked over once, no further climber-cutting need be done unless the territorial Conservator considers it necessary.

219. *Costs of regeneration and tending.*—The following estimate based upon past experience shows what is likely to be the approximate cost of regeneration and tending under normal conditions in Felling Series I and II. Wherever conditions permit, the rates should of course be reduced.

	Per acre.		
	RS.	A.	P.
(*a*) *Cost of regeneration.*—			
Heaping and burning the felling debris and cutting back sal advance growth ..	4	0	0
(*b*) *Cost of tending.*—			
First year cleaning Rs. 2 to 3 ..	2	8	0
Second year cleaning Rs. 2 to 3 ..	2	8	0
Fourth year climber cutting As. 8 to 12 ..	0	10	0
Eighth year thinning Rs. 2–8 to Rs. 3 ..	2	12	0
Thirteenth year thinning Rs. 2–8 to Rs. 3 ..	2	12	0
Total .	11	2	0
(*c*) *Cost of subsidiary tending.*—			
Climber cutting in the natural forest As. 2 to As. 4 ..	0	3	0

220. *Tabular statement of operations.*—In the paragraphs to follow, the annual programme of operations in Felling Series I and II is stated under (1) clear-felling and natural regeneration, (2) cleaning, climber-cutting and

thinning and (3) subsidiary tending, climber-cutting. The newly established crops that received varying treatment in the past are allotted according to their immediate needs so that they may gradually conform to the standard prescriptions to be applied. Special treatment is prescribed for the crops damaged by deer and bison.

221. *Plan of clear-felling and natural regeneration.*

Felling Series I and II.

Felling Series I.						Felling Series II.					
Range.	Reserve.	Block.	Coupe No.	Compartment.	Area.	Range.	Reserve.	Block.	Coupe No.	Compartment.	Area.
					1930–31.						
					ACS.						ACS.
Mojjagoda.	Galleri ..	Miniari .. Kutnikuppa.	XII	(a) 27 (b) 17	125 42	Buguda ..	Kriamba	Thalasoro.	XII	(a) 2 (b) 3 (c) 4	32 4 2
					167						38
					1931–32.						
Mojjagoda.	Galleri ..	Miniari ..	XIII	(a) 19 (b) 82 (c) 29 (d) 30 (e) 24 (f) 26	26 1 4 30 49 2	Buguda ..	Kriamba	Vondhari.	XIII	(a) 6 (b) 5	21 21
					112						42
					1932–33.						
Mojjagoda.	Galleri ..	Miniari ..	XIV	(a) 25 (b) 20 (c) 23 (d) 21 (e) 22	22 52 8 31 11	Buguda ..	Kriamba ..	Chirikipada.	XIV	(a) 7 (b) 13 (c) 12 (d) 11 (e) 10 (f) 9 (g) 8	13 2 4 4 7 2 6
					124						38
					1933–34.						
Mojjagoda.	Galleri ..	Miniari .. West of road.	XV	(a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) 6 (part). (g) 6 (part).	38 8 36 26 8 18 24	Buguda ..	Kriamba ..	Chirikipada.	XV	14	51
					158						
					1934–35.						
Mojjagoda.	Galleri ..	Suradevi	XVI	6 (balance) 7	146 2	Buguda ..	Kriamba ..	Kriamba	XVI	1	66
					148						
					1935–36.						
Mojjagoda	Galleri ..	Biripodaro.	XVII	(a) 8 (b) 9	127 2	Surada ..	Vinjigiri.	Vinjigiri ..	XVII	1	40
					129						
					1936–37.						
Mojjagoda.	Galleri ..	Biripodaro Kaliponka.	XVIII	(a) 10 (b) 11 (c) 12 (d) 13	33 82 18 5	Surada ..	Rogoda ..	Dhowpalli. Gurandia.	XVIII	(a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) 6	16 7 9 6 2 2
					138						42
					1937-38.						
Mojjagoda.	Galleri .. West of road.	Kaliponka. Kutnikuppa. Khariguda.	XIX	(a) 16 (b) 14 (c) 15 (d) 18 (e) 31 (part).	42 22 10 35 29	Surada ..	Rogoda ..	Gurandia.	XIX	7	48
					138						
					1938–39.						
Mojjagoda.	Galleri ..	Khariguda.	XX	31 (balance)	132	Surada ..	Rogoda ..	Gurandia. Tikidi ..	XX	(a) 8 (b) 9 (c) 10 (d) 11	31 5 2 6
											44
					1939–40.						
Mojjagoda.	Rambha .. Galleri ..	Poitagam. Bhalluguda. Bhalluguda	XXI	(a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) 32 (g) 33	13 11 24 38 36 28 11	Surada ..	Rogoda ..	Tikidi ..	XXI	(a) 12 (b) 13 (c) 14 (d) 15	17 6 2 18
					161						43

222. *Plan of cleaning, climber cutting and thinning.*

(a) *Felling Series I.*

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1930–31 ..	Mojjagoda.	Galleri ..	Miniari ..	XI (a) 29–30	..	46	
			Kutnikuppa	(b)	..	88	
						134	1st year cleaning.
			Miniari ..	X 28–29	..	138	2nd year cleaning.
	Kukuluba.	Chandragiri	Kriamba.	IV (a) 22–23	..	54	
			Bhallumundia.	(b)	..	62	
				(c)	..	17	
				(d)	..	20	
						153	8th year thinning.
			Chandragiri.	I 19–20	..	28	Special climber cutting.*
				II (a) 20–21	..	150	Do.
				III (e) 21–22	..	69	Special cleaning.
	Bontha ..	Brahmansai.	Gadiapada.	VIII 26–27	..	159	4th year climber cutting.
				VII (a) 25–26	..	47	
				(b)	..	81	
						128	Do. †
1931–32 ..	Mojjagoda.	Galleri ..	Miniari ..	XII (a) 30–31	27	125	
			Kutnikuppa.	(b)	17	42	
						167	1st year cleaning.
			Miniari ..	XI (a) 29–30	..	46	
			Kutnikuppa.	(b)	..	88	
						134	2nd year cleaning.
	Kukuluba.	Chandragiri.	Kriamba	V (a) 23–24	..	88	
			Tarasingi.	(b)	..	11	
			Ronogonta.	(c)	..	17	
				(d)	..	20	
				(e)	..	7	
						143	8th year thinning.
	Bontha ..	Brahmansai.	Konthosorola.	IX 27–28	..	128	4th year climber cutting.
1932–33. ..	Mojjagoda.	Galleri ..	Miniari ..	XIII (a) 31–32	19	26	
				(b)	28	1	
				(c)	29	4	
				(d)	30	30	
				(e)	24	49	
				(f)	26	2	
						112	1st year cleaning.
			Miniari ..	XII (a) 30–31	27	125	
			Kutnikuppa.	(b)	17	42	
						167	2nd year cleaning.
			Miniari ..	X 28–29	..	138	4th year climber cutting.
	Kukuluba.	..	Sappokhollo.	VI (a) 24–25	..	82	
				(b)	..	68	
						150	8th year thinning. †

* A special operation.
† Prescribed in the fifth year. Include experimental plots.
‡ Include experimental plots.

(a) *Felling Series I*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1931–32 ..	Kukuluba.	..	Chandra-giri.	I 19–20	..	28	13th year thinning.
1933–34 ..	Mojjagoda.	Galleri ..	Miniari ..	XIV (*a*) 32–33	25	22	
				(*b*)	20	52	
				(*c*)	23	8	
				(*d*)	21	31	
				(*e*)	22	11	
						124	1st year cleaning.
				XIII (*a*) 31–32	19	26	
				(*b*)	28	1	
				(*c*)	29	4	
				(*d*)	30	30	
				(*e*)	24	49	
				(*f*)	26	2	
						112	2nd year cleaning.
			Miniari ..	XI a 29–30	..	46	
				b	..	88	
						134	4th year climber cutting.
	Kukuluba.	Chandra-giri.	Chandra-giri.	II a 20–21	..	150	
				b	..	80	
						230	13th year thinning.
	Bontha ..	Brahman-sai.	Gadiapada.	VII a 25–26	..	47	
				b	..	81	
						128	8th year thinning.
1934–35 ..	Mojjagoda.	Galleri ..	Suradevi.	XV a 33–34	1	38	
				b	2	8	
				c	3	36	
				d	4	26	
				e	5	8	
				f	6 (part)	18	
				g	6 (part)	24	
						158	1st year cleaning.
			Miniari ..	XIV a 32–33	25	22	
				b	20	52	
				c	23	8	
				d	21	31	
				e	22	11	
						124	2nd year cleaning.
			Miniari ..	XII a 30–31	27	125	
			Kutnikuppa.	b	17	42	
						167	4th year climber cutting.
	Kukuluba.	Chandra-giri.	Chandra-giri.	III a 21–22	..	62	
				b	..	6	
				c	..	24	
			Kutranalo.	d	..	3	
			Borosingi.	e	..	69	
						164	13th year thinning.
	Bontha ..	Brahman-sai.	Gadiapada.	VIII 26–27	..	159	8th year thinning.

(a) Felling Series I—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1935–36 ..	Mojjagoda.	Galleri ..	Suradevi.	XVI a 34–35	6 (part)	138	1st year cleaning.
				XV a 33–34	1	38	
				b	2	8	
				c	3	36	
				d	4	26	
				e	5	8	
				f	6 (part)	18	
				g	6 (part)	24	
						158	2nd year cleaning.
			Miniari ..	XIII a 31–32	19	26	
				b	28	1	
				c	29	4	
				d	30	30	
				e	24	49	
				f	26	2	
						112	4th year climber cutting.
	Kukuluba.	Chandragiri.	Kriamba.	IV a 22–23	..	46	
			Bhallumundia.	b	..	62	
				c	..	17	
				d	..	20	
						153	13th year thinning.
	Bontha ..	Brahmansai.	Konthosorola.	IX a 27–28	..	128	8th year thinning.
1936–37 ..	Mojjagoda.	Galleri ..	Biripadaro.	XVII a 35–36	8	127	
				b	9	2	
						129	1st year cleaning.
			Suradevi.	XVI a 34–35	6 (part)	138	2nd year cleaning.
			Miniari ..	XIV a 32–33	25	22	
				b	20	52	
				c	23	8	
				d	21	31	
				e	22	11	
						124	4th year climber cutting.
				X 28–29	..	138	8th year thinning.
	Kukuluba.	Chandragiri.	Kriamba	V a	..	88	
			Tarasingi	b	..	11	
			Ronoghonta	c	..	17	
				d	..	20	
				e	..	7	
						143	13th year thinning.
1937–38 ..	Mojjagoda.	Galleri ..	Biripadaro.	XVIII a 36–37	10	33	
			Kaliponka.	b	11	82	
				c	12	18	
				d	13	5	
						138	1st year cleaning.
			Biripadaro.	XVII a 35–36	8	127	
				b	9	2	
						129	2nd year cleaning.
			Suradevi.	XV a 33–34	1	38	
				b	2	8	
				c	3	36	
				d	4	26	
				e	5	8	
				f	6 (part)	18	
				g	6 (part)	24	
						158	4th year climber cutting.

(*a*) *Felling Series I*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1937–38 ..	Mojjagoda.	Galleri ..	Miniari ..	XI a 29–30	..	46	
			Kutnikuppa.	b	..	88	
						134	8th year thinning.
	Kukuluba.	Chandragiri.	Sappokhollo.	VI a 24–25	..	82	
				b	..	68 *	
						150	13th year thinning.
1938–39 ..	Mojjagoda.	Galleri ..	Kaliponka.	XIX a 37–38	16	42	
				b	14	22	
				c	15	10	
			Kutnikuppa.	d	18	35	
			Khariguda.	e	31 (part)	29	
						138	1st year cleaning.
			Biripodaro.	XVIII a 36–37	10	33	
			Kaliponka.	b	11	82	
				c	12	18	
				d	13	5	
						138	2nd year cleaning.
			Suradevi.	XVI 34–35	6 (part)	138	4th year climber cutting.
			Miniari ..	XII a 30–31	27	125	
			Kutnikuppa.	b	17	42	
						167	8th year thinning.
	Bontha ..	Brahmansai.	Gadiapada.	VII a 25–26	..	47	
				b	..	81	
						128	13th year thinning.
1939–40 ..	Mojjagoda.	Galleri ..	Khariguda.	XX 38–39	31 (balance)	132	1st year cleaning.
			Kaliponka.	XIX a 37–38	16	42	
				b	14	22	
				c	15	10	
			Kutnikuppa.	d	18	35	
			Khariguda.	e	31 (part)	29	
						138	2nd year cleaning.
			Biripodaro.	XVII a 35–36	8	127	
				b	9	2	
						129	4th year climber cutting.
			Miniari ..	XIII a 31–32	19	26	
				b	28	1	
				c	29	4	
				d	30	30	
				e	24	49	
				f	26	2	
						112	8th year thinning.
	Bontha ..	Brahmansai.	Gadiapada.	VIII 26–27	..	159	13th year thinning.

* Include experimental plots.

(b) *Felling Series II.*

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1930–31 ..	Buguda ..	Kriamba.	Kriamba	IX a 27–28	..	1	
				b	..	31	
				d	..	10	
				e	..	1	
						43	Cutting back broken stems; 1st week of July 1930.*
			Kriamba.	X a 28–29	..	11	
			Kannusorolo.	b	..	1	
				c	..	6	
						18	Do. *
			Thalasoro.	XI a 29–30	..	22	
				b	..	10	
						32	1st year cleaning.
				X d 28–29	..	19	2nd year cleaning.
			Kriamba.	VIII a 26–27	..	21	
				b	..	2	
				c	..	12	
						35	4th year climber cutting.
			Kriamba.	VII a 25–26	..	13	
				b	..	16	
				c	..	11	
						40	Do.*
			Kriamba.	IV a 22–23	..	8	
				b	..	2	
				c	..	3	
				d	..	2	
				e	..	11	
				f	..	3	
		Kriamba.	Kriamba.	IV g 22–23	..	10	
				h	..	8	
						47	8th year thinning.
		Kurcholi B.	Kurcholi.	I a 19–20	..	31	
				b	..	5	
						36	Special climber cutting.‡
			Kurcholi.	II a 20–21	..	24	
				b	..	15	
			Kriamba.	c	..	3	
						42	Do.‡
1931–32 ..	Buguda ..	Kriamba.	Thalasoro.	XII a 30–31	2	32	
				b	3	4	
				c	4	2	
						38	1st year cleaning.
			Thalasoro.	XI a 29–30	..	22	
				b	..	10	
						32	2nd year cleaning.
				IX c 27–28	..	3	4th year climber cutting.

* The coupe was damaged by deer and bison browsing early 1930.
† Prescribed in fifth year.
‡ Also cut objectionable non-sal species.

(*b*) *Felling Series II*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1931–32 ..	Buguda ..	Kriamba.	Thalasoro.	V	..	32	8th year thinning.
				23–24			
1932–33 ..	Buguda ..	Kriamba.	Chiriki-pada.	XIII a	6	21	
				31–32			
			Vondhari.	b	5	21	
						42	1st year cleaning.
			Thalasoro. ..	XII a	2	32	
				30–31			
				b	3	4	
				c	4	2	
						38	2nd year cleaning.
			Thalasoro.	X d	..	19	4th year climber cutting.
				28–29			
			Kriamba	VI	..	54	8th year thinning.
				24–25			
		Kurcholi B.	Kurcholi.	I a	..	31	
				19–20			
				b	..	5	
				c	..	1	
						37	13th year thinning.
		Kriamba.	..	IX a	..	1	
				27–28			
				b	..	31	
				d	..	10	
				e	..	1	
						43	Special climber cutting and light cleaning.*
1933–34 ..	Buguda ..	Kriamba.	Chirikipada.	XIV a	7	13	
				32–33			
				b	13	2	
				c	12	4	
				d	11	4	
				e	10	7	
				f	9	2	
				g	8	6	
						38	1st year cleaning.
				XIII a	6	21	
				31–32			
			Vondhari.	b	5	21	
						42	2nd year cleaning.
			Thalasoro.	XI a	..	22	
				29–30			
				b	..	10	
						32	4th year climber cutting.
			Kriamba.	VII a	..	13	
				25–26			
				b	..	16	
				c	..	11	
						40	8th year thinning.
		Kurcholi B.	Kurcholi.	II a	..	24	
				20–21			
				b	..	15	
		Kriamba.	Kriamba.	c	..	3	
						42	13th year thinning.
				X a	..	11	
				28–29			
				b	..	1	
				c	..	6	
						18	Special climber cutting and light cleaning.*

* Area damaged by browsing in 1930.

(*b*) *Felling Series II*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
1934–35 ..	Buguda ..	Kriamba.	Chirikipada.	XV a 33–34	14	51	1st year cleaning.
				XIV a 32–33	7	13	
				b	13	2	
				c	12	4	
				d	11	4	
				e	10	7	
				f	9	2	
				g	8	6	
						38	2nd year cleaning.
			Thalasoro.	XII a 30–31	2	32	
				b	3	4	
				c	4	2	
						38	4th year climber cutting.
			Kriamba.	VIII a 26–27	..	21	
				b	..	2	
				c	..	12	
						35	8th year thinning.
				III 21–22	..	46	13th year thinning.
1935–36 ..	Buguda ..	Kriamba.	Kriamba.	XVI 34–35	1	66	1st year cleaning.
			Chirikipada.	XV 33–34	14	51	2nd year cleaning.
				XIII a 31–32	6	21	
			Vondhari.	XIII b 31–32	5	21	
						42	4th year climber cutting.
			Kriamba.	IX a 27–28	..	1	*
				b	..	31	
				c	..	3	
				d	..	10	
				e	..	1	
						46	8th year thinning.
				IV a 22–23	..	8	
				b	..	2	
				c	..	3	
				d	..	2	
				e	..	11	
				f	..	3	
				g	..	10	
				h	..	8	
						47	13th year thinning.
1936–37 ..	Buguda ..	Kriamba.	Kriamba.	XVI 34–35	1	66	2nd year cleaning.
			Chirikipada.	XIV a 32–33	7	13	
				b	13	2	
				c	12	4	
				d	11	4	
				e	10	7	
				f	9	2	
				g	8	6	
						38	4th year climber cutting.

* IX, a, b, d, e, damaged by browsing in 1930 to be inspected by the District Forest Officer to decide if thinning may be postponed to a later date.

(*b*) *Felling Series II*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
			Kriamba.	X a 28–29	..	11	**
			Kannusoro-lo.	b	..	1	
				c	..	6	
			Thalasoro.	d	..	19	
						37	8th year thinning.
			Kriamba.	V 23–24	..	32	13th year thinning.
	Surada ..	Vinjigiri ..	Vinjigiri ..	XVII 35–36	1	40	1st year cleaning.
1937–38 ..	Buguda ..	Kriamba.	Chirikipa-da.	XV 33–34	14	51	4th year climber-cutting.
1937–38 ..	Buguda ..	Kriamba.	Thalasoro.	XI a 29–30	..	22	
				b	..	10	
						32	8th year thinning.
			Kriamba.	VI 24–25	..	54	13th year thinning.
	Surada ..	Rogoda ..	Dhowpalli.	XVIII a 36–37	1	16	
				b	2	7	
			Gurandia.	c	3	9	
				d	4	6	
				e	5	2	
				f	6	2	
						42	1st year cleaning.
		Vinjigiri ..	Vinjigiri ..	XVII 35–36	1	40	2nd year cleaning.
1938–39 ..	Buguda ..	Kriamba.	Kriamba.	XVI 34–35	1	66	4th year climber-cutting.
			Thalasoro.	XII a 30-31	2	32	
				b	3	4	
				c	4	2	
						38	8th year thinning.
			Kriamba.	VII a 25–26	..	13	
				b	..	16	
				c	..	11	
						40	13th year thinning.
	Surada ..	Rogoda ..	Gurandia.	XIX 37–38	7	48	1st year cleaning.
			Dhowpalli.	XVIII a 36–37	1	16	
				b	2	7	
			Gurandia.	c	3	9	
				d	4	6	
				e	5	2	
				f	6	2	
						42	2nd year cleaning.
1939–40 ..	Buguda ..	Kriamba.	Chiriki-pada.	XIII a 31–32	6	21	
				b	5	21	
						42	8th year thinning.
			Kriamba.	VIII a 26–27	..	21	
				b	..	2	
				c	..	12	
						35	13th year thinning.
	Surada ..	Rogoda ..	Gurandia.	XX a 38–39	8	31	
				b	9	5	
				c	10	2	
			Tikidi ..	d	11	6	
						44	1st year cleaning.

** X a, b, c damaged by browsing in 1930, to be inspected by District Forest Officer, to decide if thinning may be postponed to a later date.

(*b*) *Felling Series II*—cont.

Year.	Range.	Reserve.	Block.	Coupe.	Compartment.	Area.	Nature of operation.
						ACS.	
			Gurandia.	XIX 37–38	7	48	2nd year cleaning.
		Vinjigiri ..	Vinjigiri ..	XVII 35–36	1	40	4th year climber-cutting.

223. *Plan of subsidiary tending climber-cutting* :—

Felling Series I and II.

Year.	Felling Series I. Range.	Reserve.	Block.	Compartment.	Area.	Felling Series II. Range.	Reserve.	Block.	Compartment.	Area.
					ACS.					ACS.
1931–32 ..	Russelkonda.	Tiliki ..	Hathiguda.	1 ..	242	Surada ..	Rogoda ..	Tikidi ..	16–20 ..	68
						Do. ..	Do. ..	Rogoda ..	21–23 ..	56
	Mojjagoda.	Galleri ..	Brahmanapodaro.	34–39 ..	97	Do. ..	Do. ..	Boladu ..	24 ..	45
		Do. ..	Burudupalli.	40 & 41.	23	Do. ..	Hukuma.	Bakhara ..	1 ..	10
		Rambha ..	Brahmanapodaro.	6 ..	24	Do. ..	Bondagocha.	Korada ..	1 ..	20
		Dhimirijoli.	Sundaraguma.	1 & 2 ..	45	Do. ..	Do. ..	Kansora ..	2–4 ..	22
		Do.	Dhimirijoli.	3–5 ..	136	Do. ..	Pippalaponka.	Bhagavanpur.	1 ..	116
		Do.	Billuapada.	6 & 7 ..	49					
		Do.	Golabandho.	8 & 9 ..	20					
		Do.	Harigodo.	10 ..	10					
					404					337
	Kukuluba.	Chandragiri.	Kriamba.	1 ..	239	Pondakhol.	Pondhakhol.	Gazilabadi.	1 & 2 ..	46
			Baghodhora.	2 ..	44	Do. ..	Do. ..	Rushikulya.	3 ..	10
			Ambakono.	3 ..	86	Do.	Do. ..	Kegaponka	4 & 5 ..	23
						Do. ..	Ponkalagam.	Korada ..	1 & 2 ..	26
					369					
						Do. ..	Dhowgam	Rushikulya.	1–5 ..	61
	Bontha ..	Brahmansai.	Gadiapada.	1–5 ..	163	Do. ..	Do. ..	Gamponkalo.	6 ..	24
		Do.	Konthosorolo.	6 ..	22	Do. ..	Do. ..	Odungi ..	7–10 ..	23
						Do. ..	Do. ..	Kalama ..	11 & 12.	61
		Do.	Bhumegerada.	13 & 14 ..	98	Do. ..	Dabuki ..	Korada ..	1–4 ..	21
						Do. ..	Do.	Rushikulya.	5 ..	16
					283					311
1932–33 ..	Russelkonda.	Tiliki ..	Tiliki ..	2–7 ..	109	Surada ..	Pippalaponka.	Rushikulya.	2–5 ..	27
		Baiballi ..	Dhowmundia.	1–5 ..	46	Do. ..	Do. ..	Sappodhimira.	6 ..	290
		Do. ..	Birikot ..	11–13 ..	35					
		Do. ..	Bopangi ..	14–17 ..	84					
					274					317
	Mojjagoda.	Darpangia.	Baniakordabadi.	1–6 ..	117					
	Do. ..	Do.	Bamsakot.	7–12 ..	81					
		Do.	Kannubandho.	13 & 14.	128					
					326					
	Kukuluba.	Chandragiri.	Ambakona.	4 ..	8					
		Do.	Samarada.	5 ..	174					
		Do.	Chakundapalli.	6 ..	47					
		Do.	Chandragiri.	7 ..	2					
		Do.	Do.	8 part.	110					
					341					
	Bontha ..	Brahmansai.	Konthosorodo.	7 part ..	300					
1933–34 ..	Russelkonda.	Baiballi ..	Khalagam.	6–7 ..	168	Surada ..	Pippalaponka.	Sappodhimira.	7 & 8 ..	100
		Do. ..	Boragam.	8–10 ..	77	Do. ..	Do. ..	Dantoligi.	9 & 10	118
						Do. ..	Do. ..	Sagadapada.	11 ..	24
					245					
						Do. ..	Do. ..	Raiguda ..	12 ..	18
	Mojjagoda.	Darpangia.	Kondikutti.	15 ..	74					
		Do.	Darpangia.	16–22 ..	258					
					332					260
	Kukuluba.	Chandragiri.	Chandragiri.	8 part ..	340					
	Bontha ..	Brahmansai.	Konthosorolo.	7 balance.	90					
		Do.	Do. ..	8 ..	7					
		Do.	Dongabhumi.	9 ..	26					
		Do.	Tirigocha.	10–12 ..	105					
		Paichalia.	Ramalokhono.	1 ..	30					
		Do.	Thalakomono.	2 ..	55					
					313					

Year.	Felling Series I. Range.	Reserve.	Block.	Compartment.	Area.	Felling Series II. Range.	Reserve.	Block.	Compartment.	Area.
					ACS.					ACS.
1934–35 ..	Kukuluba.	Chandragiri.	Chandragiri.	8 balance.	112	Surada ..	Pippalaponka.	Raiguda ..	13 ..	101
		Do. ..	Do. ..	9–13 ..	218	Do. ..	Do. ..	Adijola ..	14 ..	14
					330	Do. ..	Do. ..	Bolasi ..	15–21 ..	150
						Do. ..	Do. ..	Nondapadaro.	22 & 23.	10
						Do. ..	Do. ..	Kegaponka.	24–27 ..	31
										306
..	Bontha ..	Gogodo ..	Ramalokhono.	1–2 ..	47					
		Do. ..	Khojiripalli.	3 ..	15					
		Do. ..	Thalokomono.	4 & 5 ..	131					
		Do. ..	Nondapaju.	6 & 7 ..	34					
		Do. ..	Baddobhumi.	8 & 9 ..	11					
		Do. ..	Syarimalo.	10–12 ..	66					
		Do. ..	Gogodo ..	13–19 ..	277					
			Delingapadoro.	20 & 21.	20					
					601					
1935–36 ..	Kukuluba.	Chandragiri.	Kutnikuppa.	14 ..	66	Surada ..	Pippalaponka.	Rushikulya.	28–33 ..	56
		Do.	Sappokholo.	15–20 ..	112		Mundapitta.	Uddisingi.	1 ..	3
		Ambazora.	Kukuluba.	1–3 ..	45		Do.	Madhurobandho.	2–4 ..	18
		Do.	Jadadhara.	4 & 5 ..	68		Do.	Karuballi.	14 ..	14
		Do.	Gayagonda.	6–9 ..	51		Do.	Gummarigunda.	6 ..	8
					342		Do.	Khokaripalli.	7 & 8.	98
							Do.	Sivaguda.	9 ..	1
							Do.	Adijola ..	10 & 11.	59
							Do.	Sondaballi.	12–14 ..	29
							Dheppaguda.	Koravali.	1 ..	2
										288
1936–37 ..	Kukuluba.	Ambazora.	Kotheligodo.	10–12 ..	18					
		Do.	Rodopodaro.	13 ..	12					
		Do.	Sarthabadi.	14 & 15.	90					
		Do.	Narayanagodo.	16 ..	71					
		Gundribadi.	Badogundribadi.	1 ..	12					
		Do.	Saliki ..	2 ..	100					
		Do.	Kathopothini.	3 ..	18					
		Do.	Delingapodoro.	4 ..	9					
					330					

Section 5.—Miscellaneous Prescriptions.

224. *Demarcation.*—Every individual part of the annual coupe shall be separately demarcated by planting slab stones at the prominent corners. Each stone will bear an inscription showing the working circle, coupe number, year of working and area, e.g., P. S. T. W. C. ; XI-a ; 1929–30 ; 46 acres.

225. *Fire protection.*—The clear-felled and regenerated coupes shall be protected by 15 feet wide cleared fire lines to be fire traced every year. When two coupes adjoin one another, their outer perimeter only need be fire traced but the internal boundary between the coupes shall thereafter be maintained by the local staff. The unworked first and second quality sal forests shall be protected from fire according to the present method which consists in fire tracing 15 feet wide block lines and all important rights of way. Where the first and second quality sal forests contained in the blocks are formed into coupes, the fire tracing of the block lines may be abandoned at the discretion of the District Forest Officer, as the coupes are to be fire traced.

226. *Grazing.*—The whole working circle shall remain closed to grazing.

227. *Quarrying.*—No quarrying shall be permitted inside the forests belonging to the working circle.

228. *Charcoal burning.*—In the annual coupe under felling, contractors may be permitted to burn charcoal. It is desirable to encourage them to do this in order to get rid of as much of the felling refuse as possible to facilitate the subsequent regeneration operations.

229. *Inspection paths.*—Inspection paths six feet wide shall be cut inside the worked coupes dividing them into parts of about 20 acres each. Their maintenance is a matter for the local staff.

230. *Experimental plots.*—The seven experimental plots, in connection with white ant and fungus attack on sal, shall be treated in the same manner as the neighbouring crop. Plots 1, 3 and 6 are in Coupe VII of Brahmanasai reserve and Plots 2, 4, 5 and 7 are in Coupe VI of Chandragiri reserve. Details of these experiments are available in the District Forest Office.

SECTION 6.—CONTROL.

231. *Control records.*—The prescriptions of the working plan shall be correctly controlled and the following control records shall be maintained : (*a*) Control book, (*b*) Record of Works, (*c*) Coupe History, (*d*) Regeneration Ledger, (*e*) Control Maps and (*f*) Fire Maps. The District Forest Officer will be personally responsible for the correct posting of all the control forms and maps.

232. *Control Book.*—The Control Book shall control the clear-fellings of the Plains Sal Timber Working Circle. The prescriptions of the working plan showing the locality to be exploited will be entered in the left hand columns and the result of operations showing the locality actually exploited the yield, etc., will be entered in the right hand columns. The first entries of each year will relate to Felling Series I which will be followed by the entries dealing with Felling Series II. Deviations from the prescriptions shall be briefly explained in the remarks column, the authority being quoted in all cases. The control book will be maintained in a large stoutly bound book of forms printed on stout paper. A true extract from the control book pertaining to each range shall be maintained by each Range Officer. A sample form is given in Appendix IX.

233. *Record of Works.*—All works other than clear-fellings shall be controlled in the Record of Works. Most of the works are given in the tabular statement of operation. The prescriptions of the working plan will be shown in the left hand columns and the result of operations will be entered in the right hand columns. The first entries of each year will apply to Felling Series I and the next entries will relate to Felling Series II. Deviation from the Working plan shall be explained in the Remarks column. A book of forms printed on stout paper will be opened for the Record of Works. A true extract from the Record of Works pertaining to each range shall be maintained by each Range Officer. In this form should also be shown measures suggested in the working plan and the result of the operations and also measures carried out which are not prescribed or suggested. A sample form is given in Appendix IX.

234. *Coupe History.*—The history of each coupe shall be written up year by year by the District Forest Officer personally. All items of history shall be recorded briefly. The saleable yield from clear-fellings and thinnings, the revenue realized, etc., shall be entered ; also the expenditure incurred in regeneration and tending operations. The entries will be typed and kept in the form of a loose leaf book inside a stout cover. It is essential that all information of interest should be recorded. This will be in continuation of the Coupe Histories already written.

235. *Regeneration Ledger.*—This ledger in the prescribed form shall be posted every year for each coupe of the working circle. All items of expenditure incurred in the regeneration and tending of crops shall be entered as well as the revenue realized from thinnings, etc. A sample form is given in Appendix IX.

236. *Control maps.*—A complete set of unmounted maps on the scale of 4 inches to 1 mile, consisting of 48 sheets (43 Survey of India sheets + 5 manuscript sheets), shall be maintained as the Control Maps. In these maps the worked coupes are to be accurately posted up to date.

237. *Fire maps.*—Fire maps on 1 inch to 1 mile scale shall be maintained as prescribed in paragraph 384 and the areas burnt in each year shall be marked and numbered. In the case of the regenerated coupes, the burnt areas shall also be separately marked on neat sketches of 4 inches to 1 mile scale and these sketches should be pasted to the leaves of a blank book. A reference table on the margin will give the number of the fire, date of occurrence, cause of fire and area burt.

CHAPTER III.—WORKING PLAN FOR THE RAVINE WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF THE VEGETATION.

238. *Area.*—The area of the Ravine Working Circle is 6,425 acres and it is distributed among the seven Ghumsur ranges.

239. *General constitution.*—The ravine sal forests constitute the Ravine Working Circle which consists of 605 acres cleared and regenerated with sal from 1920–21 to 1929–30 and 5,820 acres of natural forest. The regenerated coupes of 1920–21 and 1921–22 contain small experimental plantations of teak and *Gmelina arborea.*

240. *General character of the vegetation.*—The forest resembles that of the Plains Sal Timber Working Circle and sal is the predominant species. But it is more irregular and has a larger admixture of non-sal species. The qualities of sal are comparable to the first and second qualities of the plains sal forests. In the young crops, the poorer localities are invaded by softwoods like *Grewia, Kydia* and *Odina* and by bamboos. Such areas should not originally have been included in the working circle. Bamboo is a characteristic feature of the natural forests. Sal regeneration is generally irregular and patchy and this is to some extent due to the variation in the nature of the surface soil.

SECTION 2.—DIVISION OF THE AREA.

241. *Compartments.*—Each compact area of ravine sal forest will form a compartment. The re-mapping of all the natural forests has necessitated a revision in the numbering of the compartments. The unworked compartments are now numbered serially in each reserve and tinted blue on the maps. They have no cleared boundaries, but their limits can be laid out on the ground sufficiently accurately with the help of the stockmap. The worked coupes are indicated by roman numbers and the year of working. A list of coupes and compartments occurring in each reserve will appear in Appendix VI.

242. *Felling Series.*—The Ravine Working Circle is now divided into two felling series as is the Plains Sal Timber Circle. Series I deals with the forests of the northern ranges, Russellkonda, Majjagoda, Kukuluba and Bontha. Its area is 4,470 acres which consist of 605 acres of regenerated coupes and 3,865 acres of natural forests. Series II covers the natural forests of the southern ranges, Buguda, Surada and Pondakhol. Its area is 1,955 acres. Owing to the difficult hilly country in which the forests are situated the formation of two felling series facilitates the clear-felling and natural regeneration. The markets too will be better supplied and the available staff and labour can be more fully utilized.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

243. *Stockmapping.*—Excluding the regenerated coupes, the old compartments of the Ravine Working Circle have been completely re-mapped. The compartments suitable for the Plains Sal Timber or Pole Working Circle have been separated and the non-sal forest and areas which contain bamboo to the extent of more than 50 per cent of the canopy, have been rigidly excluded. The re-mapping has been done with the object of keeping within the Ravine Circle only the true sal bearing areas of qualities which are comparable to the first and second quality sal of the plains.

244. *Valuation of the crop.*—From the natural forests, a large quantity of mature timber has already been removed for the sawmill. The residual growth of such areas will have a low sale value. Departmental clear-felling has not met with success in the past. Most of the areas will only be barely saleable to contractors. The system of utilization in the future will almost certainly be through the agency of contractors. For these reasons it has not been considered necessary to execute detailed enumerations and valuation surveys.

SECTION 4.—METHOD OF TREATMENT—FELLING SERIES I AND II.

245. *Choice of species.*—Sal will be the principal species chosen for regeneration in Felling Series I and II. Where the natural regeneration of sal is deficient

the natural species to be next selected in the order of importence are *Pterocarpus marsupium*, *Adina cordifolia*, *Terminalia tomentosa* and *Ougeinia dalbergiotdes* In Felling Series I, teak and *Gmelina arborea* will be raised artificially on a limited scale. On the best well drained soil irrespective of the presence of sal regeneration, about 10 acres will be planted with teak ; and on areas preferably those deficient in sal regeneration, about 5 acres will be planted with *Gmelina arborea.*

246. *Silvicultural system.*—The forest will be worked under a high forest clear-felling system, with natural regeneration from sal advance growth. In the areas selected for teak and *Gmelina arborea*, the regeneration of these species will be by artificial sowing or planting.

247. *Rotation.*—The original rotation of 80 years will be adhered to. According to Mr. Minchin's analysis of a few typical stems, the average quality of ravine sal remains sound to a girth 4′ 6″ and up to 5′ and is then between 60 and 80 years old. Above these girths the trees of the natural forest are usually liable to unsoundness. Therefore a rotation of 80 years was fixed by him for all the qualities in the Ravine Working Circle. We have not advanced any further in our statistical knowledge of the quality or the rate of growth of the ravine sal. At the present time there is, therefore, no reason to alter the rotation.

248. *Periodic blocks.*—In Mr. Minchin's plan the forests belonging to this working circle were theoretically divided into four periodic blocks. The relatively accessible areas were allotted to Periodic Block I to be clear-felled and regenerated during the first period of 20 years. The remaining forest formed Periodic Blocks II, III and IV in which subsidiary fellings consisting of the extraction of mature trees and improvement fellings, were prescribed. The effect of such fellings has already been discussed in paragraph 148 of Part I. These arrangements will now be replaced by a simple system of clear-felling and regenerating annual coupes in the accessible localities, and by a climber-cutting in the compartments not allotted for clear-fellings during the next ten years.

249. *Regulation of the yield.*—The yield will be regulated by area. This is the simplest method that can be applied during the period of conversion of the irregular natural forest into even-aged crops. The area of the annual coupe is obtained by dividing the total area of each felling series by the rotation. The annual coupes of Felling Series I will be 4,470 acres ÷ 80 = 56 acres. In Felling Series II the annual coupes will be 1,955 acres ÷ 80 = 24 acres. The compartments which are suitable for allotment in the next ten years have had the mature trees already extracted for the sawmill. On the basis of the contractor's figures of yield for similar areas worked in the past, the yield per acre that may be expected in the future will be about 60 cubic feet of timber and poles.

250. *Laying out the annual coupe.*—It is of great importance that the annual coupe shall be laid out properly so as to admit only the true sal bearing areas, which have a sufficiency of sal switch growth already on the ground. This last condition will not, of course, refer to these small areas in Felling Series No. I, where artificial regeneration of teak and *Gmelina* is to be undertaken (vide paragraph 251 below). With the stockmap as the guide, the limits of the compartments prescribed for clear-fellings will be marked under the personal supervision of the District Forest Officer. As far as possible the quality of the forest shall not be inferior to the first and second quality sal of the plains. Non-sal grounds shall be rigidly excluded, as also areas in which the bamboos occupy more than 50 per cent of the canopy. So long as the right type of forest is selected the stock map need not be rigidly adhered to. The perimeter of the compartments shall then be cleared to a width of 10 feet. (This width will in the following year be widened to 15 feet and then maintained as a fire line).

251. *Marking of sites for planting teak and Gmelina arborea.*—In the annual coupes of Felling Series I, the sites for planting teak and *Gmelina arborea* have been selected and indicated proximately in the Working Plan Maps. No artificial regeneration is contemplated in Felling Series II. In each coupe about 10 acres of the best well drained soil, irrespective of the presence of sal

regeneration, is chosen for teak, and 5 acres preferably on higher ground and deficient in sal regeneration is selected for *Gmelina*. The limits of these areas shall be selected by the District Forest Officer and marked by driving stout posts into the ground at suitable intervals and building cairns around the posts. These marks must be maintained while the clear-felling and regeneration are in progress.

252. *Survey of the coupe.*—The compartments demarcated on the gound shall then be carefully surveyed by an officer not below the rank of a ranger. The sites marked for teak and *Gmelina* shall also be surveyed. The survey will be completed in the cold weather not later than the month of December. The area of each compartment will be rounded off to the nearest acre.

253. *Clear-felling.*—The Agency of executing the fellings is not prescribed. It may be departmental with sales in situ, or sale depot, or through the Agency of contractors to whom the coupe of the year is sold standing. In the latter event the coupe shall be sold in January, and the contractor may be given a voidah of one year commencing from the 1st of February. Before felling is commenced whether it be by a contractor or departmentally, the trees standing along the outer edge of the coupe line shall be marked at intervals of about 1 chain, by the Range Officer's seal hammer in order to prevent illicit inroads into the forests. All species shall be felled. It is desirable to get rid of as much of the felling refuse as possible and for this purpose the burning of charcoal inside the coupe is to be encouraged. On no account shall fellings or removals be permitted to extend beyond the 15th of February which marks the commencement of the growing season of sal.

254. *Burning the felling debris.*—The regeneration area shall be completely cleared of felling debris in the manner described under the Plains Sal Timber Circle. Burning the unsaleable wood shall commence on the 1st February or as soon as it is fit to burn. Wherever possible a ground fire shall be put through and then the unburnt logs and branch wood shall be cut, piled up at selected places (preferably those devoid of sal regeneration) and burnt to ash.

255. *Natural regeneration—Cutting back sal advance growth.*—In the area to be regenerated naturally, all sal advance growth in the switch or seedling stage shall be cut back nearly flush with the ground at a height of not more than 3 inches, in the manner described under the Plains Sal Timber Circle. The operation of 'cutting back' should immediately follow the burning or be done when the latter is in its last stages. Otherwise fresh regrowth springs from the burnt back switches and cutting them back is mere waste of labour. It is of great importance to carry out all regeneration operations in an expeditious manner and complete them if possible by the end of February and in any event, not later than the middle of March.

256. *Artificial regeneration—Teak and Gmelina arborea.*—Commencing with the coupe of 1930–31, 10 acres of teak and 5 acres of *Gmelina arborea* shall be raised annually in Felling Series I. Excepting the two small experimental plantations of teak and *Gmelina arborea* raised in 1920 and 1921 in the ravine coupes, the staff has no experience or training in methods of artificial regeneration. In the present state of our knowledge it is impossible to lay down exact prescriptions. The following suggestions are made for general guidance and they may be modified to suit the local conditions, at the discretion of the District Forest Officer. It is now proposed to raise teak by planting one-year old stumps and to raise *Gmelina* by sowing the seeds of the year. Planting and sowing are to be done in June in the first downpour of the monsoon.

(*a*) *Nursery.*—The planting of teak in the forest will be at an espacement of 6 feet × 6 feet, and therefore the number of stumps required per acre will be 1,210 or, for 10 acres, the number required will be 12,100. Allowing a 40 per cent reserve the total number of plants to be raised in the nursery is about 17,000. It is estimated that a nursery of about ¼ acre may be needed. The nursery shall be opened as near to the planting area as possible, and where there is a permanent water-supply, but watering nurseries should not be resorted to unless unavoidable. The nursery work should be carried out as described in detail in the Madras Forest Pocket Book.

(*b*) *Collection of seed.*—There will be some difficulty in finding well grown, vigorous teak trees that will supply seed suitable for the production of good stumps. If the local supply is insufficient or unsatisfactory the District Forest Officer will take the advice of the Forest Research Officer and arrange to obtain good seed. The seeds of *Gmelina arborea* are to be collected in the year of sowing. This species occurs sporadically in the forest and suitable trees shall be marked beforehand. The fruit should be collected from the ground, the pulp removed and the stones well dried before the end of May. If there is difficulty in procuring seed locally, the District Forest Officer will in consultation with the Forest Research Officer, arrange to obtain supplies from elsewhere.

(*c*) *Preparation of the ground.*—Burning the felling debris will have been completed in March. The next operation is lining and staking the area to be planted, and this will be carried out in April. The espacement will be 6 feet × 6 feet. Two inspection paths 6 feet wide shall be laid out. They should intersect each other at right angles near the centre of the planting area. These paths should be absolutely straight and need not be graded. The area shall then be lined by means of two coir ropes in the manner described in the Madras Forest Pocket Book. At each six-foot mark on the ropes, bamboo stakes about 2′ 6″ long must be driven firmly into the ground. In the month of May, the soil at each stake shall be loosened by a pick-axe to a depth of about one foot and in a square of about one foot. Grass and weed growth that appears after the burning must also be cut especially around each stake.

(*d*) *Planting teak.*—In the area to be planted with teak, the notching of the one-year old stumps shall commence in the first downpour of the monsoon in June and shall be completed as expeditiously as possible. The plants in the nursery will be about one year old. They are removed from the nursery beds and stumped so as to leave about 1 inch of stem and about 6 inches of root. The stumps are then planted out at each stake into crowbar holes at an espacement of 6 feet × 6 feet. The crow-bar holes must be of the exact depth of the stump's root not more, not less. After the stump is put in, the hole is closed by driving the crow-bar in on the slant a few inches from the original hole and pressing up the earth firmly against the whole length of the root. Care should be taken to ensure that the stump makes close contact with the soil and that no air spaces are left around or below the root. The second hole must also be filled with earth so that rain water may not stagnate in it. The planting must be done under close supervision and the District Forest Officer will personally supervise the work as much as possible and teach the staff how the operations are to be carried out. Casualties must be replaced as they occur.

(*e*) *Sowing Gmelina arborea.*—In the first break of the monsoon in June, seeds of *Gmelina arborea* shall be sown at each stake to a depth of $\frac{1}{2}$ an inch to $\frac{3}{4}$ of an inch. The espacement will be 6 feet × 6 feet. Seed of the year, collected beforehand, will be used. At least twelve seeds shall be sown separately at each stake. Casulties must be replaced from the excess number of seedlings found at each stake.

257. *First year cleaning.*—In the area naturally regenerated with sal, a cleaning shall be carried out in October-November in the same manner as prescribed for the Plains Sal Timber Circle in paragraph 211. Wherever sal is deficient, useful non-sal species like *Pterocarpus marsupium*, *Adina cordifolia*, *Terminalia tomentosa* and *Ougeinia dalbergioides* shall be selected for retention. In the coupes regenerated prior to 1930–31 the cleaning shall be confined to the sal bearing areas.

In the area planted with teak and *Gmelina* it is expected that at least two weedings possibly three will be necessary between the date of planting and the end of October. The first weeding will probably be done in the middle of July and will consist in cutting back the weed growth close to the ground in a circle about 4 feet in diameter round the young plants. The second and third weedings, in September and perhaps October will consist in either scraping away with a mamuti, or digging up with a fork, all weed growth within 2 feet of either side of the lines of plants. The third weedings if it is done should be at right angles to the second. If scraping with a mamuti is done it should be

to a depth of at least half an inch. The object is to disturb and aerate the soil at the same time as the weeds are removed. These should be heaped up on the 2-foot space that is left between the worked lines. The Forest Research Officer should be consulted periodically in this matter of weeding and soil aeration. In between the weeded patches, adventitious tree species may be allowed to grow in order to suppress the grass and close the canopy, provided such species do not interfere with teak and *Gmelina*. Wherever casualties are noticed in the course of weedings they must at once be replaced. The District Forest Officer will decide the extent to which these operations are to be carried out.

258. *Second year cleaning.*—A second year cleaning shall be carried out in October—November when the sal crop is about 1 year and 8 months old. The operation will be done in the same manner as the first year cleaning. In the coupes regenerated prior to 1930–31 the cleaning shall be confined to the sal bearing areas.

The areas planted with teak and *Gmelina* shall also be weeded if necessary. The District Forest Officer will decide this point and also as to where it is to be done. If the first year's operations are successful and the weeding and soil aeration are well done it is quite possible that no attention will be necessary in the second year.

259. *Fourth year climber-cutting.*—Climbers shall be cut in the fourth year in October—November when the sal crop is about 3 years and 8 months old. The operation will be done in the manner prescribed for the plains sal timber crops in paragraph 212. In the coupes regenerated prior to 1930–31 the climber-cutting shall be confined to the sal bearing areas. Climbers shall also be cut in the areas planted with teak and Gmelina.

260. *Eighth year thinning.*—A thinning in the eighth year shall be carried out in December—January when the sal crop is about 7 years and 9 months old. The rules will be the same as those prescribed for the Plains Sal Timber Circle. In the coupes regenerated prior to 1930–31 the thinning shall be confined to the sal bearing areas.

The District Forest Officer will decide after personal inspection when the teak and *Gmelina* shall be first thinned. It will probably be necessary between the fourth and sixth year.

261. *Thirteenth year thinning.*—During the thirteenth year of life, a second thinning shall be carried out in December—January, according to silvicultural principles. The sal crop will then be about 12 years and 9 months old. The special rules prescribed for the plains sal timber crops in paragraph 214 shall be observed.

The District Forest Officer will decide after personal inspection whether the teak and *Gmelina* plantations shall also be thinned. Attempts will be made to sell the produce of the thinnings.

262. *Further thinning.*—It is uncertain whether a thinning will be necessary after a further interval of five years. At the end of the working plan period, the oldest crop will have reached an age of about 18 years. The question of further thinnings will be left for decision at the next revision of the working plan.

263. *Subsidiary tending—Climber-cutting in the natural forest.*—In the natural forest that is not allotted for clear-fellings ; during the present ten-year period climbers shall be cut once. The compartments will be prescribed so that in each range an area of about 200 acres will be covered each year. Climbers shall be cut at two points, at a height of 1 foot and 4 feet above the ground. The operation will be executed in the rainy months of July and August when the staff is not busy with other silvicultural works.

264. *Cost of regeneration and tending.*—The following table shows the probable cost of regeneration and tending in Felling Series I and II under the present conditions. Regarding artificial regeneration, our experience is limited. Ignoring the cost of clearing the ground, artificial regeneration cost Rs. 25 per acre in 1920 and Rs. 20 per acre in 1921. Until further experience is gained

it is not possible to arrive at the exact rates for each item of work. It is estimated that the cost of nursery, collection of seed, preparation of ground and planting or sowing will be about Rs. 20 per acre. Adding about Rs. 4 per acre for clearing the ground, the total cost of artificial regeneration is estimated to be about Rs. 24 per acre.

	Per acre. RS.	A.	P.
(a) *Cost of natural regeneration*—			
Heaping and burning felling debris and cutting back sal advance growth ..	4	0	0
(b) *Cost of artificial regeneration*—			
Heaping and burning felling debris	3	8	0
Nursery, collection of seed, preparation of ground, planting or sowing ..	20	0	0
Total ..	27	8	0
(c) *Cost of tending*—			
First year cleaning Rs. 2 to Rs. 3	2	8	0
Second year cleaning Rs. 2 to Rs. 3	2	8	0
Fourth year climber-cutting As. 8 to As. 12	0	10	0
Eighth year thinning Rs. 2–8–0 to Rs. 3	2	12	0
Thirteenth year thinning Rs. 2–8–0 to Rs. 3	2	12	0
Total ..	11	2	0
(d) *Cost of subsidiary tending*—			
Climber-cutting is the natural forest As. 2 to As. 4	0	3	0

265. *Tabular statement of operations.*—The annual programme of operations is given in the following pages under (1) Clear-felling, (2) Regeneration, (3) Cleaning, climber-cutting and thinning and (4) Subsidiary tending, climber-cutting.

266. Plan of clear-felling—

Felling Series I and II.

Year.	Series I. Range.	Reserve.	Coupe.	Compartment.	Area.	Series II. Range.	Reserve.	Coupe.	Compartment.	Area
					ACS.					ACS
1930–31 ..	Mojjagoda.	Rambha ..	IX	2	55	Buguda ..	Kriamba.	I	2 (part)	24
1931–32 ..	Mojjagoda.	Rambha ..	X a	1	7	Buguda ..	Kriamba.	II	2 (part)	24
			b	3	11					
			c	4	32					
					50					
1932–33 ..	Mojjagoda	Rambha	XI a	9	8	Buguda ..	Kriamba.	III	2 (part)	24
			b	10	10					
		Dharpangia.	c	9	46					
					64					
1933–34 ..	Mojjagoda	Dharpangia.	XII a	10	37	Buguda ..	Kriamba	IV	2 (part)	24
			b	11	7					
		Rambha ..	c	11 (part)	10					
					54					
1934–35 ..	Mojjagoda.	Rambha ..	XIII	11 (part)	60	Buguda ..	Kriamba.	V	2 (part)	24
1935–36 ..	Mojjagoda.	Rambha ..	XIV	11 (part)	60	Buguda ..	Kriamba..	VI	2 (part)	24
1936–37 ..	Mojjagoda.	Rambha ..	XV	11 (part)	60	Buguda ..	Kriamba.	VII	2 (part)	24
1937–38 ..	Mojjagoda	Rambha ..	XVI	11 (balance)	60	Buguda ..	Kriamba.	VIII	2 (part)	24
1938–39 ..	Mojjagoda.	Dharpangia.	XVII	8	60	Buguda ..	Kriamba.	IX	2 (part)	24
1939–40 ..	Mojjagoda.	Dharpangia.	XVIII a	7	7	Buguda ..	Kriamba.	X	2 (part)	24
				6 (part)	33					
					40					

267. Plan of regeneration—

(*a*) *Felling Series I.*

Year.	Range.	Reserve.	Coupe.		Compartment.	Area.	Nature of operation.
						ACS.	
1930–31	Mojjagoda ..	Rambha ..	IX		2	40	Natural regeneration of sal.
1931–32	Mojjagoda ..	Rambha ..	IX		2	10	Artificial regeneration of teak.
						5	Artificial regeneration of Gmelina.
			X	c	4	32	Natural regeneration of sal.
1932–33	Mojjagoda ..	Rambha ..	X	b	3	11	Artificial regeneration of teak.
				a	1	7	Artificial regeneration of Gmelina.
		Rambha ..	XI	a	9	8	
		Dharpangia		c	9 (part)	41	
						49	Natural regeneration of sal.

(a) Felling Series I—cont.

Year.	Range.	Reserve.	Coupe.	Compartment.	Area.	Nature of operation.
					ACS.	
1933–34	Mojjagoda	Rambha	XI-b	10	10	Artificial regeneration of teak.
		Dharpangia	X-c	9 (part)	5	Artificial regeneration of Gmelina.
		Dharpangia.	XII-a	10 (part)	27	
		Rambha	c	11 (part)	10	
					37	Natural regeneration of sal.
1934–35	Mojjagoda	Dharpangia.	XII-a	10 (part)	10	Artificial regeneration of teak.
			b	11	7	Artificial regeneration of Gmelina.
		Rambha	XIII	11 (part)	45	Natural regeneration of sal.
1935–36	Mojjagoda	Rambha	XIII	11 (part)	10	Artificial regeneration of teak.
					5	Artificial regeneration of Gmelina.
		Rambha	XIV	11 (part)	45	Natural regeneration of sal.
1936–37	Mojjagoda	Rambha	XIV	11 (part)	10	Artificial regeneration of teak.
					5	Artificial regeneration of Gmelina.
		Rambha	XV	11 (part)	45	Natural regeneration of sal.
1937–38	Mojjagoda	Rambha	XV	11 (part)	10	Artificial regeneration of teak.
					5	Artificial regeneration of Gmelina.
		Rambha	XVI	11 (part)	45	Natural regeneration of sal.
1938–39	Mojjagoda	Rambha	XVI	11 (part)	10	Artificial regeneration of teak.
					5	Artificial regeneration of Gmelina.
		Dharpangia.	XVII	8 (part)	45	Natural regeneration of sal.
1939–40	Mojjagoda	Dharpangia	XVII	8 (part)	10	Artificial regeneration of teak.
					5	Artificial regeneration of Gmelina.
		Dharpangia.	XVIII-a	7	7	
				6 (part)	18	
					25	Natural regeneration of sal.

(b) Felling Series II.

Year.	Range.	Reserve.	Coupe.	Compartment.	Area.	Nature of operation.
1930–31	Buguda	Kriamba	I	2 (part).	24	Natural regeneration of sal.
1931–32	Do.	Do.	II	Do.	24	Do.
1932–33	Do.	Do.	III	Do.	24	Do.
1933–34	Do.	Do.	IV	Do.	24	Do.
1934–35	Do.	Do.	V	Do.	24	Do.
1935–36	Do.	Do.	VI	Do.	24	Do.
1936–37	Do.	Do.	VII	Do.	24	Do.
1937–38	Do.	Do.	VIII	Do.	24	Do.
1938–39	Do.	Do.	IX	Do.	24	Do.
1939–40	Do.	Do.	X	Do.	24	Do.

268. Plan of weeding, cleaning, climber-cutting and thinning—

(a) Felling Series I.

Year.	Range.	Reserve.	Coupe.	Compartment.	Area.	Nature of operation.
1930–31	Mojjagoda	Rambha	VIIIa 29–30	..	40	
			b	..	74	
					114	1st year cleaning.
			VII 28–29	..	42	2nd year cleaning.
			VIa 27–28	..	14	
			b	..	20	
			c	..	13	
					47	2nd year cleaning *

* The crop was cut back and re-formed in 1928–29.

(a) Felling Series I—cont.

Year.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.	Nature of operations.
					ACS.	
1930–31 .. *cont.*	.. Mojjagoda .. —*cont.*	Rambha .. —*cont.*	V a 26–27	..	26	
			b	..	15	
					41	4th year climber-cutting.
			IV a 25–26	..	26	
			b	..	6	
					32	Special cleaning.
1931–32 ..	.. Mojjagoda ..	Rambha ..	IX 30–31	2	55	1st year cleaning *
			VIII a 29–30	..	40	
			b	..	74	
					114	2nd year cleaning.
1932–33 ..	.. Mojjagoda ..	Rambha ..	X a 31–32	1	7	
			b	3	11	
			c	4	32	
					50	1st year cleaning. *
			IX 30–31	2	55	2nd year cleaning. *
			VI a 27–28	..	14	
			b	..	20	
			c	..	13	
					47	4th year climber-cutting.
			VII 28–29	..	42	4th year climber-cutting.
			III a 24–25	..	39	
			b	..	28	
					67	8th year thinning.
1933–34 ..	.. Mojjagoda ..	Rambha ..	XI a 32–33	9	8	
			b	10	10	
		Dharpangia.	c	9	46	
					64	1st year cleaning. *
		Rambha ..	X a 31–32	1	7	
			b	3	11	
			c	4	32	
					50	2nd year cleaning. *
			VIII a 29–30	..	40	
			b	..	74	
					114	4th year climber-cutting.
			IV a 25–26	..	26	
			b	..	6	
					32	8th year thinning.
			I 20–21	..	131	13th year thinning. †
1934–35 ..	.. Mojjagoda ..	Dharpangia.	XII a 33–34	10	37	
			b	11	7	
		Rambha ..	c	11 (part)	10	
					54	1st year thinking.

* Includes weeding of teak and Gmelina plantations. † Includes teak Gmelina plantations.

(a) Felling Series I—cont.

Year.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.	Nature of operations.
					ACS.	
1934–35 .. —*cont.*	.. Mojjagoda .. —*cont.*	Rambha .. —*cont.*	XI a 32–33	9	8	
			b	10	10	
		Dharpangia.	c	9	46	
					64	2nd year cleaning *
		Rambha ..	IX 30–31	2	55	4th year climber-cutting.
			V a 26–27	..	26	
			b	..	15	
					41	8th year thinning.
			II a 21–22	..	43	
			b	..	49	
			c	..	39	
					131	13th year thinning †
1935–36 ..	.. Mojjagoda ..	Rambha ..	XIII 34–35	11 (part)	60	1st year cleaning. *
		Dharpangia.	XII a 33–34	10	37	
			b	1	7	
		Rambha ..	c	111 (part)	10	
					54	2nd year cleaning. *
			X a 31–32	1	7	
			b	3	11	
			c	4	32	
					50	4th year climber-cutting.
			VI a 27–28	..	14	
			b	..	20	
			c	..	13	
					47	8th year thinning.
1936–37 ..	.. Mojjagoda ..	Rambha ..	XIV 35–36	11 (part)	60	1st year cleaning. *
			XIII 34–35	11 (part)	60	2nd year cleaning. *
		Rambha ..	XI a 32–33	9	8	
			b	10	10	
		Dharpangia.	c	9	46	
					64	4th year climber-cutting.
		Rambha ..	VII 28–29	..	42	8th year thinning.
1937–38 ..	.. Mojjagoda ..	Rambha ..	XV 36–37	11 (part)	60	1st year cleaning. *
			XIV 35–36	11 (part)	60	2nd year cleaning. *
		Dharpangia.	XII a 33–34	10	37	
			b	11	7	
		Rambha ..	c	11 (part)	10	
					54	4th year climber-cutting.
			VIII a 29–30	..	40	
			b	..	74	
					114	8th year thinning.

* Includes weeding of teak and Gmelina plantations. † Includes teak plantation.

(*a*) *Felling Series I*—cont.

Year.	Range.	Reserve.	Coupe.	Com-partment.	Area.	Nature of operations.
					ACS.	
1937–38 .. .. —*cont.*	Mojjagoda .. —*cont.*	Rambha .. —*cont.*	III a 24–25	..	39	
			b	..	28	
					67	13th year thinning.
1938–39	Mojjagoda ..	Rambha ..	XVI 37–38	11 (balance)	60	1st year cleaning. *
			XV 36–37	11 (part)	60	2nd year cleaning. *
			XIII 34–35	11 (part)	60	4th year climber-cutting.
			IX 30–31	2	55	8th year thinning.
			IV a 25–26	..	26	
			b	..	6	
					32	13th year thinning.
1939–40	Mojjagoda ..	Dharpangia.	XVII 38–39	8	60	1st year cleaning. *
		Rambha ..	XVI 37–38	11 (balance)	60	2nd year cleaning. *
			XIV 35–36	11 (part)	60	4th year climber cutting.
			X a 31–32	1	7	
			b	3	11	
			c	4	32	
					50	8th year thinning.
			V a 26–27	..	26	
			b	..	15	
					41	13th year thinning.

(*b*) *Felling Series II.*

1931–32	Buguda ..	Kriamba ..	I 30–31	2 (part)	24	1st year cleaning.
1932–33	Do. ..	Do. ..	II 31–32	Do.	24	Do.
			I 30–31	Do.	24	2nd year cleaning.
1933–34	Do. ..	Do. ..	III 32–33	Do.	24	1st year cleaning.
			II 31–32	Do.	24	2nd year cleaning.
1934–35	Do. ..	Do. ..	IV 33–34	Do.	24	1st year cleaning.
			III 32–33	Do.	24	2nd year cleaning.
			I 30–31	Do.	24	4th year climber-cutting.
1935–36	Do. ..	Do. ..	V 34–35	Do.	24	1st year cleaning.
			IV 33 34	Do.	24	2nd year cleaning.
			II 31–32	Do.	24	4th year climber-cutting.
1936–27	Do. ..	Do. ..	VI 35–36	Do.	24	1st year cleaning.
			V 34–35	Do.	24	2nd year cleaning.
			III 32 33	Do.	24	4th year climber-cutting.
1937–38	Do. ..	Do. ..	VII 36–37	Do.	24	1st year cleaning.
			VI 35–36	Do.	24	2nd year cleaning.
			IV 33–34	Do.	24	4th year climber-cutting.
1938–39	Do. ..	Do. ..	VIII 37–38	Do.	24	1st year cleaning.
			VII 36–37	Do.	24	2nd year thinning.
			V 34–35	Do.	24	4th year climber-cutting.
			I 30–31	Do.	24	8th year thinning.
1939–40	Do. ..	Do. ..	IX 38–39	Do.	24	1st year cleaning.
			VIII 37–38	Do.	24	2nd year cleaning.
			VI 35–36	Do.	24	4th year climber-cutting.
			II 31–32	Do.	24	8th year thinning.

* Includes weeding of teak and Gmelina plantations.

269. Plan of subsidiary tending—Climber-cutting—

Felling Series I and II.

Year.	Range.	Reserve.	Compartment.	ACS.	Area. ACS.
1931–32 ..	Russelkonda.	Kaliamba ..	1 to 4	..	213
	Mojjagoda ..	Rambha	5 to 8	..	255
	Kukuluba ..	Chandragiri.	1 to 8	..	183
	Bontha ..	Brahmansai.	1 to 4	..	158
	Buguda ..	Kriamba ..	1	..	109
	Surada ..	Rogoda ..	1 to 4	51	
		Bondagocha.	1 to 3	6	
		Pippalaponka.	1 to 13	105	
					162
	Pondakhol ..	Pondakhol ..	1 to 13	..	213
1932–33 ..	Russellkonda.	Baiballi ..	1 to 8	..	167
	Mojjagoda ..	Dharpangia.	1, 2 and part of 3.	..	2 239
	Kukuluba ..	Chandragiri.	9 to 13	..	210
	Buguda	Kriamba ..	2 (part)	..	260
	Pondakhol.	Pondakhol.	16 to 23	..	208
1933–34 ..	Mojjagoda ..	Dharpangia.	3 (balance). 4 and 5	..	236
	Kukuluba ..	Ambazora ..	1 to 6	..	237
	Buguda ..	Kriamba ..	2 (balance)	..	265
	Pondakhol ..	Pondakhol ..	24 to 34	136	
			35 (part)	112	
					248
1934–35 ..	Mojjagoda ..	Dharpangia.	6 (part)	..	255
	Kukuluba ..	Ambazora ..	7 to 15	..	238
	Pondakhol ..	Pondakhol ..	35 (balance).	115	
		Do. ..	36	122	
		Dhowgam ..	1 to 4	10	
		Dabuki ..	1	3	
					250
1935–36 ..	Mojjagoda ..	Dhimirijoli.	1 & 2	103	
		Chohokkapad	1 to 5	119	
					222
	Kukuluba ..	Ambazora ..	16 to 20	..	208
1936–37 ..	Mojjagoda ..	Chokkapad.	6 to 19	..	229
	Kukuluba ..	Ambazora	21 to 27	154	
		Gundribadi.	1 to 6	98	
					252

Section 5.—Miscellaneous Prescriptions.

270. *Demarcation.*—Each individual part of the annual coupe shall be demarcated by planting slab stones at the prominent corners. The stones will be suitably inscribed with the name of the working circle, coupe number, year of working and area, e.g., R.W.C. ; VIII-*a* ; 1929–30 ; 40 acres.

271. *Fire protection.*—The clear-felled and regenerated coupes shall be protected from fire by 15 feet wide cleared boundary lines to be fire traced every year. If two coupes adjoin each other, the outermost perimeter only will be fire traced. Thereafter the internal boundary shall be kept cleared by the local staff. The ravine coupes are particularly exposed to the danger of hill fires. The fire tracing of lines should be done as thoroughly as possible and the work should be completed before the middle of February. No inflammable material will be left on the coupe lines.

272. *Grazing.*—The regenerated coupes shall be closed to grazing.

273. *Quarrying.*—No quarrying will be permitted in the forests belonging to this working circle.

274. *Charcoal burning.*—The coupe contractors may be encouraged to burn charcoal inside the annual coupes under felling. A large quantity of unsaleable wood can thus be converted into saleable produce to the benefit of the contractor and at the same time by ridding the coupe of its refuse from fellings, the subsequent departmental burning is reduced to the minimum.

275. *Inspection paths.*—One or two inspection paths 6 feet wide shall be cut inside each coupe along easy gradients.

276. *Experimental plots relating to sal regeneration.*—A brief description of the experiments conducted by the writer during 1928 in order to determine the best method of establishing sal regeneration in the Ravine circle, will be found in Appendix IV. The six experimental plots are situated in Rambha reserve in the neighbourhood of Rambha forest bungalow. The following is a brief description of the plots :—

Plot 1.—1 chain × $2\frac{1}{2}$ chains=$2\frac{1}{2}$ square chains. Selected sal seed was sown broadcast in June 1928. Enumerations were made in August 1928 and July 1929. The enumeration made in July 1929 showed 2,808 sal plants.

Plot 2.—1 chain × $2\frac{1}{2}$ chains=$2\frac{1}{2}$ square chains. Germinating sal seed was sown broadcast in June 1928. Enumerations were made in August 1928 and July 1929. The enumeration made in July 1929 showed 3,408 sal plants.

In the following July, the sal advance growth shall again be enumerated distinguishing seedling regeneration from switch regeneration. The seedling regeneration should further be classified as current year's seedlings and survivals. Subsequently the plots shall be fired periodically once every two years and enumerations carried out in the middle of the following July, and the increase of regeneration recorded. The experimental plots will be laid out under the personal supervision of the District Forest Officer. The burning and the enumerations shall be carried out by a Gazetted Officer. Fire lines should be maintained round the plots to prevent escape of fire into the surrounding forest.

Section 6.—Control.

279. *Control records.*—The prescriptions of the working plan shall be properly controlled and the control records to be maintained are as follows: (*a*) Control Book, (*b*) Record of Works, (*c*) Coupe History, (*d*) Regeneration Ledger and (*e*) Control Maps and (*f*) Fire maps. The District Forest Officer will be personally responsible for the correct posting of all the control forms and maps.

280. *Control book.*—The clear-fellings of the Ravine Working Circle shall be controlled by the Control Book. In the left hand columns will be entered the prescriptions of the working plan showing the locality to be exploited, and in the right hand columns will be entered the results of operations showing the locality actually exploited, yield, etc. The first set of entries in each year will relate to Felling Series I and the second set of entries will refer to Felling Series II. Deviations from the prescriptions will be briefly noted in the 'Remarks column,' with a reference to the sanctioning authority. A true extract from the Control Book applicable to each range shall be maintained by each Range Officer. A sample form is given in Appendix IX.

281. *Record of Works.*—The Record of Works shall control all works other than clear-fellings, most of which are outlined in the tabular statement of operations. The prescriptions of the working plan entered in the left hand columns will be compared with the results of operations entered in the right hand columns. Similarly measures suggested in the working plan and measures neither prescribed nor suggested, but carried out, will be entered. The first entrics of each year will pertain to Felling Series I and the next entries to Felling Series II. Deviations from the working plan will be briefly noted in the remarks column, with a reference to the sanctioning authority. A true extract from the Record of Works relating to each range shall be maintained by each Range Officer.

282. *Coupe History.*—The history of each coupe shall be written up by the District Forest Officer personally every year in the same manner as for the Plains Sal Timber Working Circle. All items of history will be entered briefly. The saleable yield from clear-fellings and thinnings, the revenue realized, etc., shall be recorded as well as the expenditure incurred in regeneration and tending operations. The entries will be typed and filled in a loose leaf book inside a stout cover. All information of interest should be recorded. The history of the coupes worked from 1920–21 to 1929–30 shall also be brought up to date by the District Forest Officer.

283. *Regeneration Ledger.*—This ledger shall be maintained in the prescribed form for each coupe of the working circle. All items of expenditure incurred in the regeneration and tending of crops shall be posted year after year as also the revenue realized from thinnings, etc. A sample form is given in Appendix IX.

284. *Control Maps.*—A set of unmounted 4 inch to 1 mile maps consisting of 48 sheets shall be maintained as the Control Maps in which the worked coupes are to be correctly posted up to date.

285. *Fire Maps.*—Fire maps on the scale of 1 inch to 1 mile shall be maintained as prescribed in paragraph 384 and the areas burnt in each year shall be marked and numbered. In the case of the regenerated coupes the

burnt areas shall also be separately marked on neat sketches of 4 inches to 1 mile scale and these sketches should be pasted to the leaves of a blank book. A reference list showing the number of the fire, date of occurrence, cause of the fire and area burnt will be given on the margin.

CHAPTER IV.—WORKING PLAN FOR THE PLAINS SAL POLE WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF THE VEGETATION.

286. *Area.*—The Plains Sal Pole Working Circle covers an area of 40,786 acres distributed in all the seven ranges.

287. *General constitution.*—The third quality sal forests of the plains, constitute the Plains Sal Pole Working Circle. Some of the forests actually extend from the plains to the lower margins of the hills. The total area is made up of 10,472 acres of coupes worked between 1903–04 to 1929–30 and 30,314 acres of unworked forest. The worked coupes contain 8,405 acres of sal bearing areas and 2,067 acres of broken ground and 'non-sal.' The sal bearing areas have now been differentiated on the stockmaps by a pink colour while the non-sal areas are left white. Of the unworked forest, 25,657 acres have been restock-mapped with the object of allotting the greater part to felling series. The remaining area of 4,657 acres is situated in comparatively remote localities where there is no prospect of working any coupes at present.

288. *General character of the vegetation.*—Sal is the principal species. The forest has a general resemblance to the first and second quality sal of the plains but it is inferior, more open and has a greater admixture of non-sal species. In the natural forest the sal advance growth varies in quantity with the locality and is scanty in many places. Regeneration from coppice has therefore to be relied upon in order to obtain as complete a stock as possible. The coppice coupes contain about 20 per cent of non-sal areas and broken ground. In the sal bearing areas, sal is generally mixed with various soft wood species.

SECTION 2.—DIVISION OF THE AREA.

289. *Compartments.*—Each compact area of unworked forest will be called a compartment. The compartments are not demarcated on the ground by cut lines or other natural boundaries. They are coloured on the stockmaps and are serially numbered in Arabic figures in each reserve. The worked forests form coupes which are numbered serially in each felling series. The worked coupes have cut lines for their boundaries and are distinguished by Roman numbers and the year of working. A list of compartments and coupes will be found in Appendix VII.

290. *Felling series.*—The working circle is divided into :—(*a*) the areas allotted to felling series comprising 35,009 acres, which are made up of 10,472 acres of worked coupes and 24,537 acres of unworked forest and (*b*) the areas not allotted to felling series consisting of 5,777 acres of natural forest. In consequence of the remapping of the third quality sal forests in most reserves, the old felling series have been reconstituted and additional series have been prescribed in the neighbourhood of groups of villages. The names of a few old series have been altered in favour of the names which suggest their present disposition. There will now be 23 felling series in place of the 17 series which were worked more or less during the past years. The felling series are distributed through all ranges and their average size is about 1,525 acres. The coupes and compartments which are allotted to each felling series will be found in Appendix VII. The areas not allotted to felling series are situated in remote localities where there is no prospect of working any coupes in the near future.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

291. *Stockmapping.*—At this revision, the third quality sal forests of the reserves in Russellkonda, Buguda and Surada ranges have been remapped; also the reserves of the other ranges with the exception of Rambha, Dharpangia

and Chokkapad reserves in Mojjagoda range, Ambazora and Gundribadi reserves in Kukuluba range, Paichalia and Gogodo reserves in Bontha range and Pondakhol reserve in Pondakhol range. Considerable areas of non-sal and broken ground have been excluded from the old compartments and new areas of third quality sal have been mapped. Similarly all the worked coupes dating from 1903–04 to 1929–30 have also been stockmapped in order to distinguish the sal bearing areas from the non-sal and broken ground. The former is tinted pink on the maps and the latter is left white. Of the 10,472 acres of worked coupes, it is now found that 8,405 acres only are sal bearing and 2,067 acres form the non-sal areas and broken ground. The remapping has resulted in increasing the total area of the working circle from 33,254 acres to 40,786 acres.

292. *Valuation of the crop.*—Coupes are worked mainly to meet the local demand for poles and fuel The sale of standing growth to the contractors has proved to be th e est method of working the forests and this system should continue in the future. The prices of coupes realized during the past years have been dealt with in paragraph 114 of Part I and they give a fair indication of the value of the present crop. For these reasons it has not been considered necessary to make detailed enumerations and valuation surveys.

Section 4.—Method of Treatment.

293. *Choice of species.*—Sal will be the principal species chosen for regeneration. Where sal is deficient or absent, the species to be next selected, in the order of their importance, are *Pterocarpus marsupium, Adina cordifolia, Terminalia tomentosa, Dalbergia latifolia, Diospyros melanoxylon, Chloroxylon swietenia, Ougeinia dalbergioides, Stephegyne parvifolia, Lagerstrœmia parviflora, Cleistanthus collinus, Anogeissue latifolia* and *Bridelia retusa.*

294. *Silvicultural system.*—The silvicultural system will be simple coppice. The regeneration may either be from cut back advance growth or from coppiced stools below 4 feet in girth at the ground level. Younger stools are to be preferred to older stools.

295. *Rotation.*—In Mr. Minchin's Working Plan it was assumed that the local demand was mainly for poles of 1′ 6″ to 2′ 6″ in girth and in order to produce the average size of 1′ 8″ in girth, a rotation of 25 years was prescribed. During the past eleven years we have worked more than 6,000 acres of forest by the method of selling the standing coupes to contractors. Experience makes it clear that the small timber contractors do not look upon trees below 3 feet in girth with great favour. Some of the oldest coppice crops have now reached about 25 years in age. But the crowns of trees have not abandoned the candle flame shape and the height growth continues, although many stems are approaching to what must have been the height of the original forest. This is estimated with reference to occasional old trees or standards to be seen adjacent to or within the crop. It does not appear to be economical to fell the young crop before the cessation of its main height growth unless a large proportion of it is found to be unsound. The oldest coppice crops, some 25 years in age, have been tested in three different felling series. In each case a sample strip was cut across the coupe and every tree was felled close to the ground and the stump was examined. The conclusions drawn are :—(1) About 80 per cent of the crop is sound, (2) Unsoundness does not commence at any definite size, (3) Unsoundness caused by fungus in the form of heart rot is injurious to the stem, and (4) Unsoundness originating from white ants or other agencies is of no serious consequence.

When the oldest crops reach an age of about 30 years it is expected that the crowns of trees will abandon the candle flame shape and will become branchy and spreading, indicating the commencement of a period in which girth increment will be put on. Ten years may be allowed for girth increment. If the rotation is thus fixed at 40 years it is probable that an appreciable number of individual stems will attain a girth of about 3 feet. The existence of such stems in a crop for final felling will, according to local opinion, be found to influence greatly

the price offered for the coupe. The rotation is therefore fixed at 40 years. At the next revision, the Working Plans Officer should be in a better position to decide finally on the rotation. The sample plots laid out by the Dehra Dun Forest Research Institute in Coupes I and II of Kullada Series and Coupe I of Gundribadi Series will, by that time, have attained an age of about 35 years. The measurements of trees that are recorded periodically will afford some useful data in regard to the girth increment which the trees have been putting on.

296. *Regulation of the yield.*—The yield will be regulated by area. 35,009 acres are definitely allotted to form 23 felling series. In each felling series the size of the annual coupe is obtained by dividing the area by the rotation. The non-sal areas contained in the worked coupes are excluded in calculating the size of the annual coupe. The coupes vary from 20 to 55 acres. The total area that can be worked each year is about 825 acres. The coupes and compartments which are allotted to each felling series will be found in Appendix VII. In Kontaipalli Series the compartments allotted for fellings will have been fully worked over in 1935–36. The oldest coppice crop will then be about 32 years in age. No further fellings will be carried out in this series until the oldest crop reaches the rotation age in 1943–44 and this does not take place within the period dealt with by this plan. The rough yield figures available are those furnished by coupe contractors and are therefore not reliable. The average yield on this basis for the past three years, from 1927–28 to 1929–30, works out to about 130 cubic feet of timber and poles and 334 cubic feet of fuel per acre.

297. *Laying out the annual coupe.*—The compartments prescribed for fellings will be demarcated on the ground with the help of the stockmap. The limits of each compartment will be marked personally by the Range Officer so as to select every acre of the true third quality sal. Non-sal areas and broken ground will not be included on any account. In the broken ground type of forest, gravel is usually seen on the surface and the trees are stunted. Provided the desired type of forest is selected, the stock map need not be followed rigidly. The perimeter of the coupe will be cleared to a width of 10 feet. (This width will in the following year be enlarged to 15 feet for purposes of fire protection.)

298. *Survey of the coupe.*—The compartments laid out on the ground will be correctly surveyed by an officer not below the rank of a ranger. The survey will be completed in the cold weather not later than the month of December. The area of the individual parts of a coupe will be rounded off to the nearest acre.

299. *Coppice felling.*—The present system of selling the coupes to contractors has worked smoothly in the past. Departmental working is unlikely to pay in this type of forest. If therefore in any year, coupes cannot be sold to contractors, it will not be incumbent upon the District Forest Officer to work the coupes departmentally though he may do so if it is considered advisable. The sales will be held in May and the contractor may be granted a voidah of one year commencing from the 1st of July. Before a contractor is permitted to fell an area, the trees along the outer edge of the coupe line will be hammer-marked at intervals of about 1 chain with the Range Officer's seal-hammer in order to safeguard against encroachments. The following felling rules must be observed :—

(1) All tree growth, bushes and sal advance growth will be cut.

(2) Trees 4 feet in girth and above at the ground level may be cut at any height up to 2 feet above the ground. The stumps need not be trimmed. We do not want coppice from such stumps.

(3) Trees below 4 feet in girth at ground level will be cut at any height between 6 inches and 1 foot above ground. The stools need not be trimmed. In the case of sal the cutting of trees at ground level is harmful. The bark separates from the wood for an inch or two downwards and kills the dormant buds situated at ground level.

300. *Regeneration.*—If the fellings are carried out in the manner outlined in the preceding paragraph, regeneration springs from the coppiced stools and from the cut-back sal advance growth. The contractor vacates the coupe at the end of June and until then he and his men are always in and about the coupe. The new crop may be said to date from the beginning of July.

301. *Third-year cleaning.*—In the early life of the crop, soft woods and climbers grow fast and usually suppress sal and damage its leading shoots. Where the proportion of sal is deficient, sal proves to be a weak competitor with the non-sal species. During the third year of life, a cleaning will be carried out in December–January when the crop is about 2 years and 6 months old. The object of the cleaning is to liberate the sal from the non-sal species and climbers in order to produce the maximum degree of stocking. The following rules will be observed :—

(1) All climbers will be cut, removing a length from the stem and splintering the stumps. The climbers must not be cut against the surface of the sal stems but they must be pulled out by hand and cut without injuring the sal.

(2) Non-sal species interfering with or likely to interfere with sal will be cut and laid flat on the ground.

(3) All thorny undergrowth will be cut and the stumps splintered. The other undergrowth may be cut only to the extent necessary to enable men to move about the area.

(4) No attempt will be made to reduce clumps of sal shoots or to space individual sal stems.

In the case of coupes felled prior to 1930–31 the cleaning will be confined to the sal bearing areas which are indicated in the stockmap, leaving out the non-sal parts of the coupe.

302. *Fifteenth-year thinning.*—As a result of the first cleaning, sal will get a start of about three years against the non-sal species and climbers. A thinning is prescribed in the fifteenth year of the crop's life and at that age the thinned materials are expected certainly to be saleable. Early thinnings have in the past proved practically unremunerative. It is thought that in the interval between the cleaning and the thinning, the competition amongst sal is not so serious as to cause any appreciable harm. Further, in a coppice crop there is no question of discrimination between trees of switch origin and trees of coppice origin such as to demand meticulous treatment. A thinning will therefore be executed during the fifteenth year of life in December–January when the crop is about 14 years and 6 months old. The following rules must be observed :—

(1) Thinning will be executed in accordance with ordinary silvicultural principles remembering that the next thinning is to follow ten years hence.

(2) All climbers will be cut, removing a length from the stem, and the stumps splintered. The climbers will be cut in advance of the thinning to let them wither and dry ; this is particularly necessary where the adjacent crowns of trees are interlocked by climbers. If this is not done the leaders will get bent or broken off.

(3) The most promising sal trees will be selected without any distinction between stems of switch and coppice origin. Wherever possible coppice from stools of smaller sizes are to be favoured.

(4) Multiple stems arising from a common stool will be reduced to not more than two good stems per stool.

(5) Non-sal species interfering with or likely to interfere with sal will be cut down. Where sal is deficient, other useful species to be selected in the order of importance are *Pterocarpus marsupium, Adina cordifolia, Terminalia tomentosa, Dalbergia latifolia, Diospyros melanoxylon, Chloroxylon swietenia, Ougeinia dalbergioides, Stephegyne parvifolia, Lagerstrœmia parviflora, Cleistanthus collinus, Anogeissus latifolia* and *Bridelia retusa*.

(6) All thorny undergrowth will be cut and the stumps splintered. Other undergrowth need be cut only to such an extent as will enable men to move about in the area.

(7) No definite espacement of sal is prescribed. The sal crowns in the upper storey will be given adequate growing space for the next 10 years. At the same time the thinning should not be unduly heavy as the crop is being opened out for the first time and is thereby exposed to damage by wind and storm.

(8) The marking will be done by the Range Officer, and the thinning executed under the personal supervision of a Forest Officer not below the rank of a Forester. Such Foresters will have to be taught the work by the Range Officer, at the outset.

In the case of coupes felled prior to 1930–31 the thinning is to be restricted to the sal bearing areas. The non-sal parts of the coupe are shown in white on the stockmaps. Efforts should be made to sell the produce of the thinnings.

303. *Twenty-fifth year thinning.*—In the twenty-fifth year of life, the second thinning will be carried out in December–January when the crop is about 24 years and 6 months in age. The thinning will be carried out in accordance with ordinary silvicultural principles and with reference to the rules prescribed for the fifteenth-year thinning wherever such rules apply. Double stems originating from the same stool will be reduced to one stem per stool. The aim of this thinning should be to give sal ample room for crown development in order to produce the maximum girth increment possible, before the final fellings are due. It is expected that at the rotation age individual trees will appreciate considerably in value not from the point of view of height growth but by girth increment; most of them should attain a size of about 3 feet in girth.

304. *Cost of tending.*—It is estimated that the following will be the approximate costs of the tending operations under ordinary conditions. We have had no experience of bringing up a crop under the new proposals. The rates given below should be tested and revised if necessary :—

	Per acre. RS. A. P.
Cost of tending.—	
Third-year cleaning Re. 1 to Rs. 1–4–0	1 2 0
Fifteenth-year thinning Rs. 1–4 to Rs. 1–8	1 6 0
Twenty-fifth year thinning Rs. 1–8 to Rs. 2	1 12 0
Total ..	4 4 0

305. *Tabular statement of operations.*—In the next few pages the annual programme of operations is given as follows :—(1) Coppice felling and regeneration and (2) Cleaning and thinning. The coppice crops established prior to 1930–31 have received very dissimilar treatment during the past ten years. They are now allotted for cleanings or thinnings according to their immediate requirements so that they may as early as possible conform to the standard prescriptions to be applied.

306. Plan of coppice felling and regeneration—

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area. ACS.
1930–31	Kontaipalli ..	Russellkonda ..	Kaliamba ..	XXVII		3 (part)	31
	Bankanedi ..	,, ..	,, ..	IX		28 (part)	34
	Gundribadi ..	,, ..	Tiliki ..	XXIV		1 (part)	34
	Hathiguda ..	,, ..	Baiballi ..	III		3 (part)	45
	Kullada ..	,, ..	Kullada ..	XXVI		1 (part)	22
	Siddapodaro ..	Mojjagoda ..	Galleri ..	VIII		10 (part)	52
	Mojjagoda ..	,, ..	,, ..	I		75 (part)	36
	Galleri ..	,,	Dhimirijoli ..	VII	a	27	12
					b	28	21
					c	29	4
					d	30	3
					e	31	1
							41

Year	Series.	Range.	Reserve.	Coupe.		Compartment.	Area.
							ACS.
1930–31—*cont.* ..	Gujrali ..	Mojjagoda ..	Galleri ..	II		138	44
	Tilisingi ..	Kukuluba ..	Chandragiri ..	I		11 (part)	23*
	Sorisumulo ..	,, ..	,, ..	II		65 (part)	35
	Gerada ..	Bontha ..	Jagannadprasad.	XX		4 (part)	42
	Jagannadprasad.	,, ..	,,	I		49 (part)	21†
	Brahmansai ..	,, ..	Brahmansai ..	I		28 (part)	23
	Chirikipada ..	Buguda ..	Kriamba ..	XIII	a	73	24
					b	74	2
					c	75	15
					d	76	3
					e	77	7
							51
	Bhagavanpur	,, ..	,, ..	I	a	49	24
					b	50	7
					c	51	2
					d	48	2
					e	47	1
					f	46	5
							41
	Kurcholi ..	,, ..	Kurchooli, B ..	II		1 (part)	24‡
	Panchabhuti ..	,, ..	Panchabhuti ..	XII	a	3	19
					b	4	15
							34
	Sollundi ..	Buguda ..	Sollundi ..	XX	a	1	4
					b	2	7
					c	3	16
					d	4	24
							51
	Latipada ..	Surada ..	Vinjigiri ..	XIX		8	30
	Rogoda ..	,, ..	Rogoda ..	XIV	a	43	2
					b	44	5
					c	42	6
					d	41	1
					e	40	1
					f	39 (part)	32
							47
	Surada ..	,, ..	Hukuma ..	XVI		26 (part)	23§
	Osurabandha	,, ..	Pippalaponka.	XIII	a	3	7
					b	2	13
					c	1	6
					d	14	8
							34
1931–32	Kontaipalli ..	Russellkonda ..	Kaliamba ..	XXVIII		3 (part)	31
	Bankanedi ..	,, ..	,, ..	X		28 (part)	34
	Gundribadi ..	,,	Tiliki ..	XXV	a	1 balance.	16
					b	2	6
					c	7	13
					d	8	1
							36
	Hathiguda ..	Russellkonda ..	Baiballi ..	IV	a	3	45‖
					b	1	1
					c	2	1
							47
	Kullada ..	..	Kullada ..	XXVII	a	1 balance.	22
					b	2	2
							24

* Commence from the south.
† Commence from the reserve line on the south-east.
‡ Commence from reserve line on the north-west.
§ Commence from the north.
‖ Commence from reserve line on the north.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area.
						ACS.
1931-32—*cont.* ..	Siddapodaro ..	Mojjagoda ..	Galleri ..	IX	10 (part)	51
	Mojjagoda ..	..	..	II	75 (part)	36
	Galleri ..	..	Dhimirijoli ..	VIII a	25	10
				b	26	4
				c	23	2
				d	24	3
				e	22 (part)	22 *
						41
	Gujrali ..	..	Galleri ..	III	139	40
	Tilisingi ..	Kukuluba ..	Chandragiri ..	II	11 (part)	23
	Sorisomulo ..	..	..	III a	65 balance.	26
				b	64	2
				c	63	7
						35
	Gerada ..	Bontha ..	Jaganadprasad.	XXI	4 (part)	42
	Jaganadprasad.	..	..	II	49 (part)	21
	Brahmansai ..	..	Brahmansai ..	II	28 (part)	23
	Chirikipada ..	Buguda ..	Kriamba ..	XIV a	72	48
				b	71	1
						49
	Bhagavanpur.	..	..	II	45 (part)	39
	Kurcholi ..	..	Kurcholi B ..	III	1 (part)	24
	Panchabuti ..	..	Panchabuti ..	XIII a	2	1
				b	1	1
				c	9 (part)	26
						28
	Sollundi ..	Buguda ..	Sollundi ..	XXI a	5	4
				b	6	1
				c	7	1
				d	8	2
				e	9	2
				f	10	5
				g	11	18
				h	12	2
				i	13	11
				j	14	5
				k	15	2
						53
	Latipada ..	Surada ..	Vinjigiri ..	XX a	1	1
				b	2	5
				c	3	2
				d	4	7
				e	5	2
				f	6	1
				g	7	4
				h	9	6
				i	10	2
						30
	Rogoda ..	..	Rogoda ..	XV a	39 (part)	45
				b	38	1
				c	37	1
						47
	Surada ..	..	Hukuma ..	XVII a	26 balance.	15
				b	27	1
				c	25	1
				d	24	1
						18
	Osurobondho	..	Pippalaponka.	XIV	4 (part)	32 †
1932-33 ..	.. Kontaipalli ..	Russellkonda ..	Kaliamba ..	XXIX a	3 (part)	21
				b	4	11
						32

* Commence from east.

† Commence from reserve line on south-east.

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area.
							ACS.
1932-33—*cont.* ..	Bankanedi ..	..	..	XI		28 (part)	34
	Gundribadi ..	..	Tiliki ..	XXVI		3 (part)	32 *
	Hathiguda ..	..	Baiballi ..	V		5 (part)	45
	Kullada ..	..	Kullada ..	XXVIII	a	3	5
					b	4	1
					c	5 (part)	17 †
							23
	Siddapodaro ..	Mojjagoda ..	Galleri ..	X		10 (part)	52
	Mojjagoda ..	..	..	III		75 (part)	36
	Galleri ..	..	Dhimirijoli ..	IX		22 (part)	41
	Gujrali ..	Mojjagoda ..	Galleri ..	IV	a	140	2
					b	141	32
					c	142	9
							43
	Tilisingi ..	Kukuluba ..	Chandragiri ..	III		11 (part)	23
	Sorisomulo ..	..	..	IV		62	43
	Gerada ..	Bontha ..	Jaganadprasad.	XXII		4 (part)	42
	Jaganadprasad.	..	..	III		49 (part)	21
	Brahmansai ..	..	Brahmansai ..	III		28 (part)	23
	Chirikipada ..	Buguda ..	Kriamba ..	XV		67 (part)	56
	Bhagvanpur ..	..	..	III		45 (part)	39
	Kurcholi ..	..	Kurcholi B ..	IV		1 (part)	24
	Panchabuti ..	..	Panchabuti ..	XIV		9 (part)	26
	Sollundi ..	..	Nagiri ..	XXII	a	6	14
					b	7	4
					c	8	2
					d	9	2
					e	10	5
					f	11	4
					g	12	11
					h	13	3
							45
	Latipada ..	Surada ..	Vinjigiri ..	XXI	a	15	5
					b	16	11
					c	11	1
					d	12	17
							34
	Rogoda ..	..	Rogoda ..	XVI		39 (part)	47
	Surada ..	..	Hukuma ..	XVIII	a	19	5
					b	20	4
					c	21	3
					d	22	1
					e	23	10
							23
	Osurobandho.	Surada ..	Pippalaponka.	XV		4 (part)	32
1933-34	Kontaipalli ..	Russelkonda ..	Kaliamba ..	XXX		3 (part)	31
	Bankanedi ..	Russelkonda ..	Kaliamba ..	XII		28 (part)	34
	Gundribadi ..	..	Tiliki ..	XXVII		3 (part)	34
	Hathiguda ..	..	Baiballi ..	VI		5 (part)	45
	Kullada ..	..	Kullada ..	XXIX		5 (part)	23
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XI		10 balance	52
	Mojjagoda ..	..	..	IV		75 (part)	36
	Galleri ..	..	Dhimirijoli ..	X		22 (part)	41
	Gujrali ..	..	Galleri ..	V	a	143	1
					b	144	1
					c	145	2
					d	146	6
					e	147	30
							40
	Tilisingi ..	Kukuluba ..	Chandragiri ..	IV		11 balance	22
	Sorisomulo ..	..	..	V	a	66	16
					b	67	1
					c	68	2
					e	61	9
							28

* Commence from coupe VII.
† Commence from the north.

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area.
							ACS.
1933–34—*cont.* ..	Gerada ..	Bontha ..	Jaganadprasad.	XXIII		4 (part)	42
	Jaganadprasad.	..	..	IV		49 (part)	21
	Brahmansai ..	..	Brahmansai ..	IV		28 (part)	23
	Chirikipada ..	Buguda ..	Kriamba ..	XVI		67 (part)	56
	Bhagavanpur	..	..	IV		45 (part)	39
	Kurcholi ..	..	Kurcholi B ..	V		1 (part)	24
	Panchabuti ..	..	Panchabuti ..	XV	a	9 balance	25
					b	8	1
					c	7	1
					d	6	1
					e	5	2
							30
	Sollundi ..	Buguda ..	Nagiri ..	XXIII	a	5	25
					b	4	1
					c	3	4
					d	2	9
							39
	Latipada ..	Surada ..	Vinjigiri ..	XXII	a	13 (part)	30 *
					b	14	3
							33
	Rogoda ..	Surada ..	Rogoda ..	XVII		39 (part)	48
	Surada ..	..	Hukuma ..	XIX	a	28	6
					b	29	2
					c	30	3
					d	31	9
							20
	Osurobandho ..	..	Pippalaponka.	XVI		4 balance	33
1934–35	Kontaipalli ..	Russellkonda ..	Kaliamba ..	XXXI		3 balance	31
	Bankanedi ..	..	..	XIII		28 (part)	34
	Gundribadi ..	..	Tiliki	XXVIII		3 (part)	34
	Hathiguda ..	..	Baiballi ..	VII		5 (part)	45
	Kullada ..	..	Kullada ..	XXX	a	5 balance	20
					b	6	3
							23
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XII		11	39
	Mojjagoda ..	..	..	V		75 (part)	36
	Galleri ..	..	Dhimirijoli ..	XI		22 balance	41
	Gujrali ..	..	Galleri ..	VI		149 (part)	36
	Tilisingi ..	Kukuluba ..	Chandragiri ..	V	a	12	6
					b	13	25
					c	18	5
							36
	Sorisomulo ..	Kukuluba ..	..	VI		69	38
	Gerada ..	Bontha ..	Jaganadprasad.	XXIV		4 (part)	42
	Jaganadprasad.	..	..	V		49 (part)	21
	Brahmansai ..	..	Brahmansai ..	V		28 (part)	23
	Chirikipada ..	Buguda ..	Kriamba ..	XVII		67 (part)	56
	Bhagvanpur ..	..	..	V		45 balance	39
	Kurcholi ..	..	Kurcholi B ..	VI		1 (part)	24
	Panchabuti ..	..	Panchabuti ..	XVI	a	10	33
					b	11	1
					c	12	2
					e	13	2
							38
	Sollundi ..	Buguda ..	Nagiri ..	XXIV		1	47
	Latipada ..	Surada ..	Vinjigiri ..	XXIII		13 (part)	32
	Rogoda ..	..	Rogoda ..	XVIII		39 balance	48
	Surada ..	..	Hukuma ..	XX	a	32	2
					b	33	17
					c	34	1
							20
	Osurobandho	..	Pippalaponka.	XVII		7	30

* Commence from the west.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area.
						Acs.
1935–36 ..	.. Kontaipalli ..	Russellkonda ..	Kaliamba ..	XXXII a	5	5*
				b	6	10
				c	7	1
				d	8	12
				e	9	3
						31
	Bankanedi ..	Russelkonda ..	Kaliamba ..	XIV	28 (part)	34
	Gundribadi ..		Tiliki ..	XXIX	3 (part)	34
	Hathiguda ..		Baiballi ..	VIII	5 balance	46
	Kullada ..		Kullada ..	XXXI a	7	5
				b	8	1
				c	9	1
				d	10	1
				e	11	17
						25
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XIII	9 (part)	45†
	Mojjagoda ..			VI	75 balance	37
	Galleri ..		Dhimirijoli ..	XII a	21	2
				b	20	6
				c	19	2
				d	18	1
				e	17	7
				f	16 (part)	22
						40
	Gujrali ..		Galleri ..	VII	149 (part)	36
	Tilisingi ..	Kukuluba ..	Chandragiri ..	VI a	14	15
				b	15	3
				c	16	6
				d	17	8
						32
	Sorisomulo ..			VII a	70	6
				b	71	4
				c	72	6
				d	73	7
				e	74	15
						38
	Gerada ..	Bontha ..	Jaganadprasad.	XXV	4 (part)	42
	Jaganadprasad.	Bontha ..	Jaganadprasad.	VI	49 (part)	21
	Brahmansai ..		Brahmansai ..	VI a	28 balance	7
				b	29	2
				c	30	3
				d	27	14
						26
	Chirikipada ..	Buguda ..	Kriamba ..	XVIII	67 (part)	56
	Bhagvanpur ..			VI	38 (part)	43
	Kurcholi ..		Kurcholi B ..	VII	1 (part)	24
	Panchabuti ..		Panchabuti ..	XVII a	14	2
				b	15	2
				c	16	38
						42
	Sollundi ..	Buguda ..	Kaddapada ..	XXV	1 (part)	45‡
	Latipada ..	Surada ..	Vinjigiri ..	XXIV a	13 balance	39
				b	17	1
				c	18	10
				d	19	2
				e	20	8
						60
	Rogoda ..		Rogoda ..	XIX a	86	2
				b	87	3
				c	88	4
				d	89	25
				e	90	1

* Fellinga in Kontaipalli series closes.
† Commence from the north.
‡ Commence from the south.

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area.
							ACS.
1935–36—*cont.* ..	Rogoda—*cont.*				f	91	5
					g	92	3
							43
	Surada ..		Hukuma ..	XXI	a	1	2
					b	2	12
					c	3	1
					d	5	6
					e	6	4
							25
	Osurobondho.		Pippalaponka.	XVIII	a	5	18
					b	6	10
					c	8	5
					d	9	5
							38
1936–37	Bankanedi ..	Russelkonda ..	Kaliamba ..	XV		28 (part)	34
	Gundribadi ..		Tiliki ..	XXX		3 (part)	34
	Hathiguda ..		Baiballi ..	IX	a	4	14
					b	6	30
							44
	Kullada ..		Kullada ..	XXXII	a	12	2
					b	13	19
							21
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XIV		9 (part)	45
	Mojjagoda ..	Mojjagoda ..	Galleri ..	VII	a	76	8
					b	77	3
					c	78	1
					d	79	24
					e	80	7
							43
	Galleri ..		Dhimirijoli ..	XIII		16 balance	36
	Gujrali ..		Galleri ..	VIII		149 balance	36
	Tilisingi ..	Kukuluba ..	Chandragiri ..	VII		10 (part)	25
	Sorisomulo ..			VIII		75	24
	Gerada ..	Bontha ..	Jaganadprasad.	XXVI		4 (part)	42
	Jaganadprasad.			VII		49 (part)	21
	Brahmansai ..		Brahmansai ..	VII		32 (part)	22
	Chirikipada ..	Buguda ..	Kriamba ..	XIX		67 (part)	56
	Bhagvanpur ..			VII		38 (part)	44
	Kurcholi ..		Kurcholi B ..	VIII		1 (part)	24
	Panchabuti ..		Panchabuti ..	XVIII		36	41
	Sollundi ..		Kuddapada ..	XXVI		1 (part)	45
	Latipada ..	Surada ..	Dumu Dumi ..	XXV	a	21	3
					b	22	13
					c	23	7
					d	24	4
					e	25	1
					f	26	7
							35
	Rogoda ..		Rogoda ..	XX		85 (part)	46 *
	Surada ..	Surada ..	Hukuma ..	XXII	a	7	4
					b	8	1
					c	9	2
					d	10	6
					e	11	2
					f	14	8
							23
	Osurobondho.		Pippalaponka ..	XIX	a	10	10
					b	13 (part)	24 †
							34
1937–38	Bankanedi ..	Russelkonda ..	Kaliamba ..	XVI		28 (part)	34
	Gundribadi ..		Tiliki ..	XXXI		3 (part)	34

* Commence from the east.
† Commence from the north.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area.
						ACS.
	Hathiguda ..		Baiballi ..	X a	7	17
				b	8	30
						47
1937–38—*cont.* ..	Kullada ..	Russelkonda ..	Kullada ..	XXXIII a	14	4
				b	15	3
				c	16	7
				d	17	4
						18
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XV	9 (part)	45
	Mojjagoda ..			VIII a	88	2
				b	89	3
				c	90	5
				d	91	7
				e	92	3
				f	93	10
				g	94	2
				h	95	3
				i	96	2
						37
	Galleri ..	Mojjagoda ..	Dhimirijoli ..	XIV a	15	5
				b	14	2
				c	13	7
				d	12	2
				e	11	2
				f	10	1
				g	9	1
				h	7	8
						28
	Gujrali ..		Galleri ..	IX a	150	1
				b	151	31
				c	152	1
				d	153	8
				e	154	2
						43
	Tilingsi ..	Kukuluba ..	Chandragiri ..	VIII	10 (part)	25
	Sorisomulo ..			IX	76 (part)	39 *
	Gerada ..	Bontha ..	Jaganadprasad.	XXVII	4 balance	25
					10 (part)	20
						45
	Jaganadprasad.			VIII	49 (part)	21
	Brahmansai ..		Brahmansai ..	VIII	32 (part)	22
	Chirkipada ..	Buguda ..	Kriamba ..	XX	67 (part)	56
	Bhagvanpur ..			VIII	38 balance	44
	Kurcholi ..		Kurcholi B ..	IX	1 (part)	24
	Panchabuti ..		Panchabuti ..	XIX	31 (part)	34
	Sollundi ..		Kuddapada ..	XXVII a	1 balance	19
				b	2	2
				c	3	2
				d	4 (part)	22
						45
	Latipada ..	Surada ..	Dumu Dumi ..	XXVI a	2	14
				b	1	3
				c	4	9
						26
	Rogoda ..		Rogoda ..	XXI	85 (part)	46
	Surada ..		Hukuma ..	XXIII a	12	22
				b	13	1
						23
	Osurobandho.		Pippalaponka.	XX	13 balance	34
1938–39	Bankanedi ..	Russelkonda ..	Kaliamba ..	XVII a	44	23
				b	45	4
				c	27	2
				d	26	5
						34

* Commence from the south.

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area.
							ACS.
1938–39—*cont.* ..	Gundribadi ..		Tiliki ..	XXXII	a	3 balance	20
					b	4	2
					c	5	8
					d	6	6
							36
	Hathiguda ..		Baiballi ..	XI		10 (part)	42
	Kullada ..		Kullada ..	XXXIV		21	27
	Siddapodaro ..	Mojjagoda ..	Galleri ..	XVI		9 (part)	45
	Mojjagoda ..			IX	a	81	2
					b	82	26
					c	83	8
					d	84	2
					e	85	1
					f	86	2
					g	87	14
							55
	Galleri ..		Dhimirijoli ..	XV	a	5	9
					b	6	10
					c	8	25
							44
	Gujrali ..	Mojjagoda ..	Galleri ..	X		148 (part)	54
	Tilisingi ..	Kukuluba ..	Chandragiri ..	IX		10 balance	26
	Sorisomulo ..			X		76 (part)	35
	Gorada ..	Bontha ..	Jaganadprasad.	XXVIII		10 (part)	40
	Jaganadprasad.			IX		49 (part)	21
	Brahmansai ..		Brahmansai ..	IX		32 (part)	22
	Chirikipada ..	Buguda ..	Kriamba ..	XXI		67 (part)	56
	Bhagvanpur ..			IX		39	39
	Kurcholi ..		Kurcholi B ..	X		1 balance	26
	Panchabhuti ..		Panchabhuti ..	XX		31 (part)	34
	Sollundi ..		Kuddapada ..	XXVIII		4 balance	45
	Latipada ..	Surada ..	Dumu Dumi ..	XXVII		3 (part)	33
	Rogoda ..		Rogoda ..	XXII	a	85 balance	9
					b	84	2
					c	83	35
							46
	Surada ..		Hukuma ..	XXIV	a	18	5
					b	17	1
					c	16	19
					d	15	4
							29
	Osurobandho		Pippalaponka.	XXI	a	15	6
					b	16	21
					c	17	8
					d	18	2
							37
1939–40	Bankanedi ..	Russelkonda ..	Kaliamba ..	XVIII	a	25	8
					b	10	22
					c	11	2
					d	12	2
					e	13	2
					f	14	1
					g	15	2
					h	16	2
					i	17	2
							43
	Gundribadi ..	Russelkonda ..	Tiliki ..	XXXIII	a	9	1
					b	10	3
					c	11	1
					d	12	3
					e	13	21
					f	14	2
					g	15	6
							37
	Hathiguda ..		Baiballi ..	XII	a	10 balance	40
					b	11	2
					c	9	11
							53

Year.	Series.	Range.	Reserve.	Coupe.		Compartment.	Area. ACS.
1939–40—*cont.*	Kullada		Kullada	XXXV		23	27
	Siddapodaro	Mojjagoda	Galleri	XVII	a	9 balance	19
					b	8	29
							48
	Mojjagoda			X	a	74	8
					b	73	2
					c	72	2
					d	71	2
					e	70	2
					f	69	4
					g	62 (part)	25
							45
	Galleri		Dhimirijoli	XVI	a	4	20
					b	3	12
					c	2	10
							42
	Gujrali		Galleri	XI		148 balance	55
	Tilisingi	Kukuluba	Chandragiri	X	a	5	3
					b	6	5
					c	7	10
					d	8	4
					e	9	1
							23
	Sorisomulo			XI		76 (part)	35
	Gerada	Bontha	Jaganadprasad.	XXIX		10 (part)	40
	Jaganadprasad.			X		49 balance.	21
	Brahmansai		Brahmansai	X		32 (part)	23
	Chirikipada	Buguda	Kriamba	XXII		67 (part)	56
	Bhagvanpur			X	a	37	8
					b	36	1
					c	35	3
					d	34	2
					e	33	8
					f	30	14
					g	31	2
					h	32	3
							41
	Kurcholi		Kurcholi B	XI		2 (part)	24
	Panchabhuti		Panchabhuti	XXI		31 (part)	34
	Sollundi		Kuddapada	XXIX	a	5 (part)	45
					b	6	2
							47
	Latipada	Surada	Dumu Dumi	XXVIII	a	3 balance	24
					b	7	2
					c	8	2
					d	9	2
					e	10	3
					f	11	2
							35
	Rogoda		Rogoda	XXIII	a	82	15
					b	81	1
					c	80	1
					d	79	5
					e	78	1
					f	77	26
							49
	Surada		Raipada	XXV	a	11	1
					b	12	9
					c	13	3
							30
	Osurobandho—		Pippalaponka.	XXII		12	40

307. Plan of cleaning and thinning—

NOTE.—In the case of coupes worked prior to 1930–31 the sal-bearing area is indicated by the numerator and the total area by the denominator of a fraction wherever sal and non-sal have been separately distinguished.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area * Sal / Total.	Nature of operation.
1930–31 ..	Kontaipalli.	Russellkonda.	Kaliamba.	XXII 25–26	a	48	
					b	5	
						53	3rd year cleaning. *
				XXIII 26–27		32	Do. *
				XXIV 27–28		74/80	Do. *
				XII 15–16		40	15th year thinning.
				I 03–04		29	25th year thinning. *
				III 05–06		34/36	Do.
..	Bankanedi.	Russellkonda.	Kaliamba.	IV 25–26		59	3rd year cleaning.
				V 26–27		47	Do. *
				VI 27–28		25	Do.
	Gundribadi.	Russellkonda.	Tiliki ..	XIX 25–26	a	13/23	
					b	25/38	Do. *
				XX 26–27		72/81	Do. *
				XXI 27–28		49/89	Do.
				XI 15–16		41	15th year thinning.
				I 03–04		33/34	25th year thinning. *
				III 05–06		14/26	Do.
	Kullada ..	Russellkonda.	Kullada ..	XXI 25–26		76/88	3rd year cleaning. *
				XXII 26–27		38/41	Do. *
				XXIII 27–28		39/73	Do.
				XI 13–14		4/12	15th year thinning.*
				XIII 15–16		22/25	Do.
				I 03–04		6/9	25th year thinning.*
				III 05–06		8	Do.
	Siddapodaro.	Mojjagoda.	Galleri ..	IV 25–26		30/34	3rd year cleaning.*
				V 27–28		37/40	Do.
	Galleri ..	Mojjagoda.	Galleri ..	III 25–26		25	Do. *
				IV 26–27		30	Do. *
				V 27–28		24/27	Do.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal — Total.	Nature of operation.
1930–31 ..	Gerada ..	Bontha ..	Jaganadprasad.	XV 25–26		48	3rd year cleaning. *
				XVI 26–27		52	Do. *
				XVII 27–28		71	Do.
				XI 15–16		27 — 30	15th year thinning.
				I 03–04		31 — 64	25th year thinning.*
	Chirikipada.	Buguda ..	Kriamba.	VIII 25–26		38 — 58	3rd year cleaning.*
				IX 26–27		63 — 71	Do. *
				X 27–28		39 — 85	Do.
	Panchabhuti.	Buguda ..	Panchabhuti.	VII 25–26		35	Do.
				VIII 26–27		56	Do. *
				IX 27–28		25	Do.
	Sollundi ..	Buguda ..	Sollundi ..	XV 25–26		43 — 46	Do. *
			Nagiri ..	XVI 26–27		15 — 56	Do. *
				XVII 27–28		28 — 75	Do.
			Budrungu.	II 12–13	b	35 — 46	15th year thinning. †
				V 15–16		33 — 42	Do.
				VI 16–17	b	26	Do. ‡
	Latipada.	Russellkonda.	Malati ..	IX 20–21	b	14	3rd year cleaning. *
				X 21–22	c	19 — 23	Do. *
				XI 22–23	d	10 — 16	Do. *
				XII 23–24	c	11 — 15	Do. *
				XIII 24–25	b	3 — 34	Do. *
		Surada ..	Vinjigiri ..	XIV 25–26	a	19 — 33	Do. *
			Dumu Dumi.		b	19 — 27	Do. *
			Vinjigiri ..	XV 26–27	a	14 — 30	Do. *
					b	25 — 30	Do. *
			Dumu Dumi.		c	32 — 34	Do. *
				XVI 27–28		10	Do.
		Russellkonda.	Malati ..	VIII 19–20	c	10 — 20	Thinning.

* Overdue for this operation.
† Overdue for this operation ; crop not tended previously.
‡ Prescribed earlier as the crop was not tended previously.
§ Special operation ; crop not tended previously.

Year.	Series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area Sal / Total.	Nature of operation.
1930–31—*cont.* ..	Latipada —*cont.*	Surada ..	Dumu Dumi.	I 10–11		36 / 65	15th year thinning. *
				II 11–12		29 / 55	Do. *
				III 13–14		11 / 26	Do. *
				IV 14–15	a	8 / 55	Do. *
				V 16–17	a	17 / 21	Do. §
	Rogoda ..	Surada ..	Rogoda ..	IX 25–26	a	24	3rd year cleaning. *
				X 26–27	a	18	
					b	22 / 26 / 40	Do. *
				X 27–28	a	42 / 55	
					b	18 / 60	3rd year cleaning.
	Surada ..	Surada ..	Raipada ..	X 24–25	a	6 / 18	3rd year cleaning. *
				XI 25–26	a	26 / 27	Do. *
			Hukuma.		b	20	Do. *
			Raipada ..	XII 26–27	a	23	Do. *
			Hukuma.		b	18 / 36	Do. *
			Bondagocha.		c	23	Do. *
			Raipada ..	XIII 27–28	a	25 / 26	Do.
			Boudagocha.		b	26	Do.
	Osuro-bandho.	Surada ..	Munda-pitta.	IX 25–26		15 / 16	3rd year cleaning. *
				X 26–27		8 / 15	Do. *
		Pondakhol.	Dhowgam.	I 17–18	b	66	15th year thinning. ‡
				II 18–19	b	60 / 66	Do. ‡
		Surada ..	Munda-pitta.	III 19–20		12	Do. ‡
1931–32 ..	Kontaipalli.	Russell-konda.	Kaliamba.	XXV 28–29		19 / 64	3rd year cleaning.
				XIII 16–17		19 / 33	15th year thinning.
				II 04–05		32 / 35	25th year thinning. *
				IV 06–07		30 / 34	Do.
	Bankanedi.	Russell-konda.	Kaliamba.	VII 28–29		54	3rd year cleaning.

* Overdue for this operation.
† Overdue for this operation ; crop not tended previously.
‡ Prescribed earlier as the crop was not tended previously.
§ Special operation ; crop not tended previously.

Year.	Series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area Sal — Total.	Nature of operation.
1931–32 —*cont.*	Gundribadi.	Russell-konda.	Tiliki ..	XXII 28–29		51	3rd year clearing.
				XII 16–17		34	15th year thinning.
				II 04–05		26	25th year thinning. *
				IV 06–07		33	Do.
	Hathiguda.	Russell-konda.	Baiballi ..	I 28–29		3 — 41	3rd year cleaning.
	Kullada ..	Russell-konda.	Kullada ..	XXIV 28–29		15 — 45	Do.
				II 04–05		10	25th year thinning.*
				IV 06–07		13	Do.
	Siddapodaro.	Mojjagoda.	Galleri ..	VI 28–29		25 — 31	3rd year cleaning.
	Galleri ..	Mojjagoda.	Galleri ..	VI 28–29		21 — 25	Do.
	Gerada ..	Bontha ..	Jaganad-prasad.	XVIII 28–29		66 — 90	Do.
				II 04–05		51 — 53	25th year thinning.*
				III 06–07		41	Do.
	Chirikipada.	Buguda ..	Kriamba.	XI 28–29		60 — 103	3rd year cleaning.
	Pancha-bhuti.	Buguda ..	Pancha-bhuti.	X 28–29		34	Do.
	Sollundi ..	Buguda ..	Nagiri ..	XVIII 28–29		14 — 73	Do.
			Sollundi ..	VI 16–17	a	46	15th year thinning.
	Latipada	Surada ..	Dumu Dumi.	XVII 28–29		20 — 28	3rd year cleaning.
	Rogoda ..	Surada ..	Rogoda ..	XII 28–29	a	41 — 56	Do.
					b	6 — 27	Do.
				I 16–17		18	15th year thinning.
	Surada ..	Surada ..	Raipada ..	XIV 28–29	a	2 — 48	3rd year cleaning.
			Hukuma.		b	14 — 61	Do.
			Raipada ..	III 16–17		23 — 34	15th year thinning.
	Osuro-bandho.	Surada ..	Munda-pitta.	XI 28–29		8 — 15	3rd year cleaning.
1932–33 ..	Kontai-palli.	Russell-konda.	Kaliamba.	XXVI 20 30	a b c	18 12 6 — 36	3rd year cleaning.
				XIV 17–18		35	15th year thinning.
				V 07–08		40	25th year thinning.
	Bankanedi.	Russell-konda.	Kaliamba.	VIII 29–30		30	3rd year cleaning.

* Overdue for this operation.

Year.	Series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area Sal / Total.	Nature of operation.
1932–33—*cont.*	Gundribadi.	Russell-konda.	Tiliki ..	XXIII 29–30		44	3rd year cleaning.
						— 53	
				XIII a 17–18		26	
				b		33	
						— 38	15th year thinning.
						— 59	25th year thinning.
				V 07–08		— 44	
	Hathiguda.	Russell-konda.	Baiballi ..	II 29–30		36	3rd year cleaning.
						— 40	
	Kullada ..	Russell-konda.	Kullada ..	XXV 29–30		25	Do.
				XIV 17–18		26	15th year thinning.
				V 07–08		45	25th year thinning.
						— 94	
	Siddapodaro.	Mojjagoda.	Galleri ..	VII 29–30		15	3rd year cleaning.
						— 27	
				II 17–18		24	15th year thinning.
						— 30	
	Gujrali ..	Mojjagoda.	Galleri ..	I 29–30		34	3rd year cleaning.
	Gerada ..	Bontha ..	Jaganad-prasad.	XIX 29–30		37	Do.
				IV 07–08		51	25th year thinning.
	Chirikipada.	Buguda ..	Kriamba.	XII 29–30		25	3rd year cleaning.
						— 30	
	Kurcholi	Buguda ..	Kurcholi A.	I 29–30		17	Do.
						— 48	
	Pancha-bhuti.	Buguda ..	Pancha-bhuti.	XI 29–30		36	Do.
	Sollundi ..	Buguda ..	Nagiri ..	XIX 29–30		28	Do.
						— 36	
			Sollundi ..	VII a 17–18		44	15th year thinning.
	Latipada..	Surada ..	Dumu Dumi.	XVIII 29–30		25	3rd year cleaning.
						— 30	
	Rogodo ..	Surada ..	Rogoda ..	XIII a 29–30		38	
				b		29	
						— 35	
						67	3rd year cleaning.
	Surada ..	Surada ..	Hukuma	XV 29–30		13	Do.
	Osuro-bandho.	Surada ..	Mundapitta.	XII 29–30		10	Do.
1933–34 ..	Kontaipalli.	Russell-konda.	Kaliamba.	XXVII 30–31	3 part	31	Do.
				XV 18–19		34	15th year thinning.
				VI 08–09		24	25th year thinning.
	Bankanedi	Russell-konda.	Kaliamba	IX 30–31	28 part	34	3rd year cleaning.
	Gundri-guda.	Russell-konda.	Tiliki ..	XXIV 30–31	1 part	34	Do.
				XIV 18–19		34	15th year thinning.
				VI 08–09		36	25th year thinning.
						— 40	
	Hathiguda.	Russell-konda.	Baiballi ..	III 30–31	3 part	45	3rd year cleaning.
	Kullada ..	Russell-konda.	Kullada ..	XXVI 30–31	1 part	22	Do.
				XV 18–19		27	15th year thinning.
						— 28	
				VI 08–09		10	25th year thinning.
						— 23	

Year.	Series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area Sal —— Total.	Nature of operation.
1933–34—*cont*..	Sidda-podaro.	Mojjagoda.	Galleri ..	VIII 30–31	10 part	52	3rd year cleaning.
				III 18–19	a	17	
						—	
						18	
					b	20	
						—	
						24	
						—	
						37	15th year thinning.
						—	
	Mojjagoda.	Mojjagoda.	Galleri ..	I 30–31	75 part	36	3rd year cleaning.
	Galleri ..	Mojjagoda.	Dhimirijoli.	VII 30–31	a 27	12	
					b 28	21	
					c 29	4	
					d 30	3	
					e 31	1	
						—	
						41	3rd year cleaning.
						—	
	Gujrali ..	Mojjagoda	Galleri ..	II 30–31	138	44	Do.
	Tilisingi ..	Kukuluba.	Chandragiri.	I 30–31	11 part	23	Do.
	Sorisomulo.	Kukuluba.	Chandragiri.	II 30–31	65 part	35	Do.
			Chodiapalli.	I 18–19		21	15th year thinning.
	Gerada ..	Bontha ..	Jaganad-prasad.	XX 30–31	4 part	42	3rd year cleaning.
	Jaganad-prasad.	Bontha ..	Jaganad-prasad.	I 30–31	49 part	21	Do.
	Brahmansai.	Bontha ..	Brahmansai.	I 30–31	28 part	23	Do.
	Chirikipada.	Buguda ..	Kriamba.	XIII 30–31	a 73	24	
					b 74	2	
					c 75	15	
					d 76	3	
					e 77	7	
						—	
						51	3rd year cleaning.
						—	
				I 18–19		44	15th year thinning.
	Bhagvanpur.	Buguda ..	Kriamba.	I 30–31	a 49	24	
					b 50	7	
					c 51	2	
					d 48	2	
					e 47	1	
					f 46	5	
						—	
						41	3rd year cleaning.
						—	
	Kurcholi	Buguda ..	Kurcholi B.	II 30–31	1 part	24	Do.
	Pancha-bhuti.	Buguda	Pancha-bhuti.	XII 30–31	a 3	19	
					b 4	15	
						—	
						34	3rd year cleaning.
						—	
	Sollundi ..	Buguda ..	Sollundi ..	XX 30–31	a 1	4	
					b 2	7	
					c 3	16	
					d 4	24	
						—	
						51	3rd year cleaning.
						—	
				VIII 18–19	a ..	54	
			Budrungu.		b	22	
						—	
						25	
					c	10	
						—	
						86	15th year thinning.
						—	

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal Total.	Nature of operation.
1933–34—*cont.*	Latipada.	Surada ..	Vinjigiri ..	XIX 30–31	8	30	3rd year cleaning.
				VII a 18–19		13	
						36	
			Dumu Dumi.	b		23	
						54	
		Russell-konda.	Malati ..	c		27	
						38	
			..			63	15th year thinning.
	Rogada ..	Surada ..	Rogoda ..	XIV a 30–31	43	2	
				b	44	5	
				c	42	6	
				d	41	1	
				e	40	1	
				f	39 part.	32	
			..			47	3rd year cleaning.
				III a 18–19		125	
						144	
				b		42	
						64	
						167	15th year thinning.
	Surada ..	Surada ..	Hukuma.	XVI 30–31	26 part	23	3rd year cleaning.
			Raipada ..	V 18–19		51	15th year thinning.
						71	
	Osuro-bandho.	Surada ..	Pippala-ponka.	XIII a 30–31	3	7	
				b	2	13	
				c	1	6	
				d	14	8	
						34	3rd year cleaning.
1934–35 ..	Kontaipalli.	Russell-konda.	Kaliamba.	XXVIII 31–32	3 part	31	Do.
				XVI a 19–20		16	
				b		7	
						23	15th year thinning.
				VII 09–10		29	25th year thinning.
						40	
	Bankanedi.	Russell-konda.	Kaliamba.	X 31–32	28 part.	34	3rd year cleaning.
	Gundribadi.	Russell-konda.	Tiliki ..	XXV a 31–32	1 balance.	16	
				b	2	6	
				c	7	13	
				d	8	1	
						36	3rd year cleaning.
				VII 09–10		28	25th year thinning.
	Hathiguda.	Russell-konda.	Baiballi ..	IV a 31–32	3	45	
				b	1	1	
				c	2	1	
						47	3rd year cleaning.
	Kullada ..	Russell-konda.	Kullada ..	XXVII a 31–32	1 balance.	22	
				b	2	2	
						24	3rd year cleaning.
				XVI 19–20		50	15th year thinning.
				VII 09–10		25	25th year thinning.
						33	

Year.	Series.	Range.	Reserve.	Coupe.		Com-part-ment.	Area. Sal. Total.	Nature of operation.
1934-35—*cont...*	Sidda-podaro.	Mojjagoda.	Galleri ..	IX 31-32		10 part.	51	3rd year cleaning.
	Mojjagoda.	Mojjagoda.	Galleri ..	II 31-32		75 part.	36	Do.
	Galleri ..	Mojjagoda.	Dhimirijoli.	VIII 31-32	a	25	10	
					b	26	4	
					c	23	2	
					d	24	3	
					e	22 part.	22	
							41	3rd year cleaning.
	Gujrali ..	Mojjagoda.	Galleri ..	III 31-32		139	40	Do.
	Tilisingi ..	Kukuluba.	Chandra-giri.	II 31-32		11 part.	23	Do.
	Sorisomulo.	Kukuluba.	Chandra-giri.	III 31-32	a	65 balance.	26	
					b	64	2	
					c	63	7	
							35	3rd year cleaning.
	Gerada ..	Bontha ..	Jaganad-prasad.	XXI 31-32		4 part.	42	Do.
				XII 19-20			17	15th year thinning.
				V 09-10			3	25th year thinning.
							7	
	Jaganad-prasad.	Bontha ..	Jaganad-prasad.	II 31-32		49 part.	21	3rd year cleaning.
	Brahman-sai.	Bontha ..	Brahman-sai.	II 31-32		28 part.	23	Do.
	Chiriki-pada...	Buguda ..	Kriamba.	XIV 31-32	a	72	48	
					b	71	1	
							49	3rd year cleaning.
				II 19-20			30	15th year thinning.
	Bhagvan-pur.	Buguda ..	Kariamba.	II 31-32		45 part.	39	3rd year cleaning.
	Kurcholi.	Buguda ..	Kurcholi B.	III 31-32		1 part.	24	Do.
	Pancha bhuti.	Buguda ..	Pancha-bhuti.	XIII 31-32	a	2	1	
					b	1	1	
					c	9 part.	26	
							28	3rd year cleaning.
				I 19-20			36	15th year thinning.
	Sollundi ..	Buguda ..	Sollundi ..	XXI 31-32	a	5	4	
					b	6	1	
					c	7	1	
					d	8	2	
					e	9	2	
					f	10	5	
					g	11	18	
					h	12	2	
					i	13	11	
					j	14	5	
					k	15	2	
							53	3rd year cleaning.
				IX 19-20			62	15th year thinning.
	Latipada.	Surada ..	Vinjigiri ..	XX 31-32	a	1	1	
					b	2	5	
					c	3	2	
					d	4	7	
					e	5	2	
					f	6	1	
					g	7	4	
					h	9	6	
					i	10	2	
							3[illegible]	3rd year cleaning.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area. Sal. Total.	Nature of operation.
1934–35—*cont.*	Latipada —*cont.*	Vinjigiri —*cont.*	Dumu Dumi.	VIII 19–20 a		19	
		Russell-konda.	Malati ..	b		10	
						13	
						29	15th year thinning.
	Rogoda ..	Surada ..	Rogoda ..	XV 31–32 a	39 part.	45	
				b	38	1	
				c	37	1	
						47	3rd year cleaning.
				IV 19–20 a		32	
						40	
				b		18	
				c		28	
						78	15th year thinning.
	Surada ..	Surada ..	Hukuma.	XVII 31–32 a	26 balance.	15	
				b	27	1	
				c	25	1	
				d	24	1	
						18	3rd year cleaning.
			Raipada ..	VI 19–20		34	15th year thinning.
						36	
	Osurobandho.	Surada ..	Pippalaponka.	XIV 31–32	4 part.	32	3rd year cleaning.
1935–36 ..	Kontaipalli.	Russell-konda.	Kaliamba.	XXIX 32–33 a	3 part.	21	
				b	4	11	
						32	3rd year cleaning.
				XVII 20–21 a		45	
				b		10	
						20	
						55	15th year thinning.
	Bankanedi	Russell-konda.	Kaliamba.	XI 32–33	28 part.	34	3rd year cleaning.
	Gundribadi.	Russell-konda.	Tiliki ..	XXVI 32–33	3 part.	32	Do.
	Hathiguda.	Russell-konda.	Baiballi ..	V 32–33	5 part.	45	Do.
	Kullada ..	Russell-konda.	Kullada ..	XXVIII 32–33 a	3	5	
				b	4	1	
				c	5 part.	17	
						23	3rd year cleaning.
				VIII 10–11		23	
						30	25th year thinning.
	Siddapodaro.	Mojjagoda.	Galleri ..	X 32–33	10 part.	52	3rd year cleaning.
	Mojjagoda.	Mojjagoda.	Galleri ..	III 32–33	75 part.	36	Do.
	Galleri	Mojjagoda.	Dhimirijoli.	IX 32–33	22 part.	41	Do.
	Gujrali ..	Mojjagoda.	Galleri ..	IV 32–33 a	140	2	
				b	141	32	
				c	142	9	
						43	3rd year cleaning.
	Tilisingi ..	Kukuluba.	Chandragiri.	III 32–33	11 part.	23	Do.
	Sorisomulo.	Kukuluba.	Chandra. giri.	IV 32–33	62	43	Do.
	Gerada ..	Bontha ..	Jaganadprasad.	XXII 32–33	4 part.	42	Do.

Year.	Series.	Range.	Reserve.	Coupe.	Com-partment.	Area Sal. Total.	Nature of operation.
1935-36—*cont.*	Gerada—*cont.*	Bontha—*cont.*	Jaganad-prasad.	VI 10–11		20	25th year thinning.
						26	
	Jaganad-prasad.	Do. ..	Do.	III 32–33	49 part.	21	3rd year cleaning.
	Brahman-sai.	Do. ..	Brahman-sai.	III 32–33	28 part.	23	Do.
	Chiriki-pada.	Buguda ..	Kriamba.	XV 32–33	67 part.	56	Do.
				III 20–21		38	15th year thinning.
						46	
	Bhagvan-pur.	Do. ..	Do.	III 32–33	45 part.	39	3rd year cleaning.
	Kurcholi..	Do. ..	Kurcholi B.	IV 32–33	1 part.	24	Do.
	Pancha-bhuti.	Do. ..	Pancha-bhuti.	XIV 32–33	9 part.	26	Do.
				II 20–21		31	15th year thinning.
						33	
	Sollundi ..	Do. ..	Nagiri ..	XXII a 32–33	6	14	
				b	7	4	
				c	8	2	
				d	9	2	
				e	10	5	
				f	11	4	
				g	12	11	
				h	13	3	
						45	3rd year cleaning.
				X 20–21		47	15th year thinning.
	Latipada.	Surada ..	Vinjigiri ..	XXI a 32–33	15	5	
				b	16	11	
				c	11	1	
				d	12	17	
						34	3rd year cleaning.
			Dumu-dumi.	IX a 20–21		35	
						37	
		Russell-konda.	Malati ..	b		10	
						13	
						45	15th year thinning.
		Surada ..	Dumu-dumi.	I 10–11		36	25th year thinning.
						65	
	Rogoda ..	Surada ..	Rogoda ..	XVI 32–33	39 part.	47	3rd year cleaning.
				V a 20–21		30	
						53	
				b		23	
						53	15th year thinning.
	Surada ..	Do. ..	Hukuma	XVIII a 32–33	19	5	
				b	20	4	
				c	21	3	
				d	22	1	
				e	23	10	
						23	3rd year cleaning.
			Raipada ..	VII a 20–21		11	
						16	
			Hukuma	.. b		22	
						24	
						33	15th year thinning.

Year.	Series.	Range.	Reserve.	Coupe.	Com-partment.	Area. Sal. / Total.	Nature of operation.
1935-36—*cont.*	Osuroban-dho.	Surada.	Pippala-ponka.	XV 32–33	4 part.	32	3rd year cleaning.
			Munda-pitta.	IV 20–21 a		8	
				b		7	
						8	
						15	15th year thinning.
1936-37 ..	Kontai-palli.	Russell-konda.	Kaliamba.	XXX 33–34	3 part.	31	3rd year cleaning.
				XVIII 21–22 a		44	
				b		20	15th year thinning.
						64	
				VIII 11–12		21	25th year thinning.
						41	
	Bankanedi.	Do.	Do.	XII 33–34	28 part.	34	3rd year cleaning.
	Gundribadi.	Do.	Tiliki	XXVII 33–34	3 part.	34	Do.
				XV 21–22		37	15th year thinning.
	Hathiguda	Do.	Baiballi ..	VI 33–34	5 part.	45	3rd year cleaning.
	Kullada ..	Do.	Kullada ..	XXIX 33–34	5 part.	23	Do.
				XVII 21–22		28	15th year thinning.
						30	
				IX 11–12 a		24	
						54	
				b		7	
						13	
						31	25th year thinning.
	Sidda-podaro.	Mojjagoda.	Galleri ..	XI 33–34	10 balance.	52	3rd year cleaning.
	Mojjagoda.	Do.	Do. ..	IV 33–34	75 part.	36	Do.
	Galleri ..	Do.	Dhimiri-joli.	X 33–34	22 part.	41	Do.
	Gujrali ..	Do.	Galleri ..	V 33–34 a	143	1	
				b	144	1	
				c	145	2	
				d	146	6	
				e	147	30	
						40	Do.
	Tilisingi ..	Kukuluba.	Chandra-giri.	IV 33–34	11 balance.	22	Do.
	Sorisomulo.	Do.	Do.	V 33–34 a	66	16	
				b	67	1	
				c	68	2	
				d	61	9	
						28	Do.
	Gerada ..	Bontha ..	Jaganad-prasad.	XXIII 33–34	4 part.	42	Do.
				VII 11–12		32	25th year thinning.
	Jaganad-prasad.	Do. ..	Do.	IV 33–34	49 part.	21	3rd year cleaning.
	Brahman-sai.	Do. ..	Brahman-sai.	IV 33–34	28 part.	23	Do.
	Chiriki-pada.	Buguda ..	Kriamba.	XVI 33–34	67 part.	56	Do.
				IV 21–22		45	15th year thinning.
						46	
	Bhagvan-pur.	Do. ..	Do.	IV 33–34	45 part.	39	3rd year cleaning.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal. Total.	Nature of operation.
1936–37—*cont.*	Kurcholi	Buguda ..	Kurcholi B.	V 33–34	1 part.	24	3rd year cleaning.
	Pancha-bhuti.	Do. ..	Pancha-bhuti.	XV 33–34	a 9 balance.	25	
					b 8	1	
					c 7	1	
					d 6	1	
					e 5	2	
						30	Do.
				III 21–22		46	15th year thinning.
						55	
	Sollundi ..	Do. ..	Nagiri ..	XXIII 33–34	a 5	25	
					b 4	1	
					c 3	4	
					d 2	9	
						39	3rd year cleaning.
			Sollundi ..	XI 21–22		48	15th year thinning.
						49	
				I 11–12		32	25th year thinning.
						34	
	Latipada	Surada ..	Vinjigiri ..	XXII 33–34	a 13 part.	30	
					b 14	3	
						33	3rd year cleaning.
				X 21–22	a	62	
						65	
			Dumu-dumi.		b	29	
						32	
			Malati ..		c	19	
						23	
						110	15th year thinning.
			Dumu-dumi.	II 11–12		29	25th year thinning.
						55	
	Rogoda ..	Do. ..	Rogoda ..	XVII 33–34	39 part.	48	3rd year cleaning.
				VI 21–22		26	15th year thinning.
						27	
	Surada ..	Do. ..	Hukuma	XIX 33–34	a 28	6	
					b 29	2	
					c 30	3	
					d 31	9	
						20	3rd year cleaning.
	Osuroban-dho.	Do. ..	Pippala-ponka.	XVI 33–34	balance.	33	Do.
	Do.	Do. ..	Munda-pitta.	V 21–22		12	15th year thinning.
						22	
1937–38 ..	Kontai-palli.	Russell-konda.	Kaliamba.	XXXI 34–35	3 balance.	31	3rd year cleaning.
				XIX 22–23		40	15th year thinning.
				IX 12–13		41	25th year thinning.
						44	
	Bankanedi.	Do.	Do.	XIII 34–35	28 part.	34	3rd year cleaning.
				I 22–23		27	15th year thinning.
						38	
	Gundri-badi.	Do.	Tiliki ..	XXVIII 34–35	3 part.	34	3rd year cleaning.
				XVI 22–23		46	15th year thinning.
						52	

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal. Total.	Nature of operation.
1937–38—*cont.*	Gundri-badi.	Russell-konda.	Tiliki ..	VIII 12–13		60	25th year thinning.
	Hathiguda.	Do. ..	Baiballi ..	VII 34–35	5 part.	45	3rd year cleaning.
	Kullada ..	Do. ..	Kullada ..	XXX 34–35	a 5 balance.	20	
					b 6	3	
						23	Do.
				XVIII 22–23		52	15th year thinning.
				X 12–13		33	25th year thinning.
						38	
	Sidda-podaro.	Mojjagoda.	Galleri ..	XII 34–35	11	39	3rd year cleaning.
	Mojjagoda.	Do.	Do. ..	V 34–35	75 part.	36	Do.
	Galleri ..	Do.	Dhimiri-joli.	XI 34–35	22 balance.	41	Do.
	Gujrali ..	Do.	Galleri ..	VI 34–35	149 part.	36	Do.
	Tilisingi ..	Kukuluba.	Chandra-giri.	V 34–35	a 12	6	
					b 13	25	
					c 18	5	
						36	Do.
	Sorisomulo.	Do.	Do ..	VI 34–35	69	38	Do.
	Gerada ..	Bontha ..	Jagand-prasad.	XXIV 34–35	4 part.	42	Do.
				VIII 12–13		28	25th year thinning.
	Jaganad-prasad.	Do. ..	Do. ..	V 34–35	49 part.	21	3rd year cleaning.
	Brahman-sai.	Do. ..	Brahman-sai.	V 34–35	28 part.	23	Do.
	Chiriki-pada.	Buguda ..	Kriamba.	XVII 34–35	67 part.	56	Do.
				V 22–23		50	15th year thinning.
	Bhagvan-dur.	Do. ..	Do. ..	V 34–35	45 balance.	39	3rd year cleaning.
	Kurcholi.	Do. ..	Kurcholi B.	VI 34–35	1 part.	24	Do.
	Pancha-bhuti.	Buguda ..	Pancha-bhuti.	XVI 34–35	a 10	33	
					b 11	1	
					c 12	2	
					d 13	2	
						38	3rd year cleaning.
				IV 22–23		38	15th year thinning.
	Sollundi	Do. ..	Nagiri ..	XXIV 34–35	1	47	3rd year cleaning.
			Sollundi ..	XII 22–23		41	15th year thinning.
						46	
				II 12–13	a	39	
			Budrungu.		b	35	
						46	
						74	25th year thinning.
	Latipada.	Surada ..	Vinjigiri ..	XXIII 34–35	13 part.	32	3rd year cleaning.
				XI 22–23	a	16	
						18	
					b	22	
			Dumu-dumi.		c	26	
						29	
			Malati ..		d	10	
						16	

Year.	Series.	Range.	Reserve.	Coupe.	Com-partment.	Area Sal. / Total.	Nature of operation.
						74	15th year thinning.
1937–38—*cont.*	Rogoda ..	Surada ..	Rogoda ..	XVIII 34–35	39 balance.	48	3rd year cleaning.
				VII 22–23	a	30	
						41	
					b	15	
						45	15th year thinning.
	Surada ..	Do. ..	Hukuma.	XX 34–35	a 32	2	
					b 33	17	
					c 34	1	
						20	3rd year cleaning.
			Raipada.	VIII 22–23	a	6	
						22	
			Hukuma.		b	17	
						30	
					c	6	
						29	
						29	15th year thinning.
	Osuro-bandho.	Do. ..	Pippala-ponka.	XVII 34–35	7	30	3rd year cleaning.
			Mundapitta.	VI 22–32	a	11	
						12	
					b	6	
						17	15th year thinning.
1938–39 ..	Kontai-palli.	Russell-konda.	Kaliamba.	XXXII 35–36	a 5	5	
					b 6	10	
					c 7	1	
					d 8	12	
					e 9	3	
						31	3rd year cleaning.
				XX 23–24		44	15th year thinning.
				X 13–14		52	
						56	25th year thinning.
	Bankanedi.	Do. ..	Do.	XIV 35–36	28 part	34	3rd year cleaning.
				II 23–24		47	
						52	15th year thinning.
	Gundri-badi.	Do. ..	Tiliki ..	XXIX 35–36	3 part	34	3rd year cleaning.
				XVII 23–24		32	
						54	15th year thinning.
				IX 13–14		40	25th year thinning.
	Hathiguda.	Do. ..	Baiballi ..	VIII 35–36	5 balance.	46	3rd year cleaning.
	Kullada ..	Do. ..	Kullada ..	XXXI 35–36	a 7	5	
					b 8	1	
					c 9	1	
					d 10	1	
					e 11	17	
						25	Do.
				XIX 23–24		47	
						52	15th year thinning.
				XI 13–14		4	
						12	25th year thinning.

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal. — Total.	Nature of operation.
1938–39—*cont.*	Sidda-podaro.	Mojjagoda.	Galleri ..	XIII 35–36	9 part	45	3rd year cleaning.
	Mojjagoda.	Do.	Do. ..	VI 35–36	75 balance.	37	Do.
	Galleri ..	Do.	Dhimiri-joli.	XII 35–36	a 21	2	
					b 20	6	
					c 19	2	
					d 18	1	
					e 17	7	
					f 16 part	22	
						40	Do.
			Galleri ..	I 23–24		25 — 26	15th year thinning.
	Gujrali ..	Do.	Do. ..	VII 35–36	149 part	36	3rd year cleaning.
	Tilisingi.	Kukuluba.	Chandra-giri.	VI 35–36	a 14	15	
					b 15	3	
					c 16	6	
					d 17	8	
						32	3rd year cleaning.
	Sorisomulo.	Do.	Do.	VII 35–36	a 70	6	
					b 71	4	
					c 72	6	
					d 73	7	
					e 74	15	
						38	Do.
	Gerada ..	Bontha ..	Jagannad-prasad.	XXV 35–36	4 part	42	Do.
				XIII 23–24		17	15th year thinning.
				IX 13–34		32	25th year thinning.
	Jagannad-prasad.	Do. ..	Do.	VI 35–36	49 part	21	3rd year cleaning.
	Brahman-sai.	Do. ..	Brahman-sai.	VI 35–36	a 28 balance.	7	
					b 29	2	
					c 30	3	
					d 27	14	
						26	Do.
..	Chirikipada.	Buguda ..	Kriamba.	XVIII 35–36	67 part	56	3rd year cleaning.
				VI 23–24		56 — 58	15th year thinning.
	Bhagvanpur.	Do. ..	Do.	VI 35–36.	38 part	43	3rd year cleaning.
	Kurcholi.	Do. ..	Kurcholi B.	VII 35–36.	1 part	24	Do.
	Pancha-bhuti.	Do. ..	Pancha-bhuti.	XVII 35–36	a 14	2	
					b 15	2	
					c 16	38	
						42	Do.
				V 23–24		40	15th year thinning.
	Sollundi ..	Do. ..	Kudda-pada.	XXV 35–36	1 part	45	3rd year cleaning.
			Nagiri ..	XIII 23–24		43 — 45	15th year thinning.
			Sollundi.	III 13–14		33 — 40	25th year thinning.
	Latipada.	Surada ..	Vinjigiri ..	XXIV 35–36	a 13 balance.	9	

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal. / Total.	Nature of operation.
1938–39—*cont.*	Latipada..	Surada ..	Vinjigiri—*cont.*	XXIV 35–36 b	17	1	
				c	18	10	
				d	19	2	
				e	20	8	
						30	3rd year cleaning.
	Do.	Do.	Do.	XII 23–24 a		36	
						38	
				b		22	
			Dumudumi.	c		26	
						29	
		Russellkonda.	Malati ..	d		10	
						16	
						94	15th year thinning.
			Dumudumi.	III 13–14		11	25th year thinning.
						26	
	Rogoda ..	Surada ..	Rogoda ..	XIX 35–36 a	86	2	
				b	87	3	
				c	88	4	
				d	89	25	
				e	90	1	
				f	91	5	
				g	92	3	
						43	3rd year cleaning.
				VIII 23–24 a		26	
						40	
				b		15	
						41	15th year thinning.
	Surada ..	Do. ..	Hukuma.	XXI 35–36 a	1	2	
				b	2	12	
				c	3	1	
				d	5	6	
				e	6	4	
						25	3rd year cleaning.
			Raipada ..	IX 23–24 a		15	
						31	
			Hukuma	b		29	
						36	
						44	15th year thinning.
	Osurobandho.	Surada ..	Pippalaponka.	XVIII 35–36 a	5	18	
				b	6	10	
				c	8	5	
				d	9	5	
						38	3rd year cleaning.
			Mundapitta.	VII 23–24		15	15th year thinning.
1939–40	Kontaipalli.	Russellkonda.	Kaliamba.	XXI 24–25		60	15th year thinning.
				XI 14–15.		32	25th year thinning.
	Bankanedi.	Do.	Do. ..	XV 36–37	28 part	34	3rd year cleaning.
				III 24–25		75	15th year thinning.
	Gundribadi.	Do.	Tiliki ..	XXX 36–37.	3 part	34	3rd year cleaning.
				XVIII 24–25		50	15th year thinning.
						54	

Year.	Series.	Range.	Reserve.	Coupe.	Compartment.	Area Sal. Total.	Nature of operation.
1939–40—*cont.*	Hathiguda.	Russellkonda.	Baiballi ..	X 14–15		55	25th year thinning.
				IX 36–37	a 4	14	
					b 6	30	3rd year cleaning.
						44	
	Kullada ..	Do. ..	Kullada ..	XXXII 36–37	a 12	2	
					b 13	19	
						21	Do.
				XX 24–25	a	22	
					b	7	
						19	
						29	15th year thinning.
	Do. ..	Do. ..	Do. ..	XII 14–15		15	25th year thinning.
						28	
	Siddapodaro.	Mojjagoda.	Galleri ..	XIV 36–37	9 part	45	3rd year cleaning.
	Mojjagoda.	Do. ..	Do. ..	VII 36–37	a 76	8	
					b 77	3	
					c 78	1	
					d 79	24	
					e 80	7	
						43	Do.
	Galleri ..	Do. ..	Dhimirijoli. ..	XIII 36–37	16 balance.	36	Do.
				II 24–25		21	15th year thinning.
	Gujrali ..	Do. ..	Galleri ..	VIII 36–37	149 balance.	36	3rd year cleaning.
	Tilisingi ..	Kukuluba.	Chandragiri.	VII 36–37	10 part	25	Do.
	Sorisomulo.	Do. ..	Do. ..	VIII 36–37	75	24	Do.
	Gerada ..	Bontha ..	Jaganadprasad.	XXVI 36–37	4 part	42	Do.
				XIV 24–25		54	15th year thinning.
				X 14–15		30	25th year thinning.
						31	
	Jaganadprasad.	Bontha ..	Jaganadprasad.	VII 36–37	49 part	21	3rd year cleaning.
	Brahmansai.	Do. ..	Brahmansai.	VII	32 part	22	Do.
	Chirikipada.	Buguda ..	Kriamba.	XIX 36–37	67 part	56	Do.
				VII 24–25		43	15th year thinning.
						52	
	Bhagvanpur.	Do. ..	Do. ..	VII 36–37	38 part	44	3rd year cleaning.
	Kurcholi.	Do. ..	Kurcholi B.	VIII 36–37	1 part	24	Do.
	Panchabhuti.	Do. ..	Panchabhuti.	XVIII 36–37	36	41	Do.
				VI 24–25		44	15th year thinning.
	Latipada.	Surada ..	Dumudumi.	XXV 36–37	a 21	3	
					b 22	13	
					c 23	7	
					d 24	4	
					e 25	1	
					f 26	7	
						35	3rd year cleaning.
	Do.	Do. ..	Do. ..	XIII 24–25	a	27	
						33	
			Malati ..		b	3	
						34	
						30	15th year thinning.

Year.	Series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area Sal / Total.	Nature of operation.
1939–40—*cont.*	Latipada—*cont.*	Surada—*cont.*	Dumu-Dumi.	IV 14–15	a	8	
						55	
..			Malati ..		b	4	
						22	
						12	25th year thinning.
	Rogoda ..	Do.	Rogoda ..	XX 36–37.	85 part.	46	3rd year cleaning.
	Surada ..	Do.	Hukuma.	XXII 36–37	a 7	4	
					b 8	1	
					c 9	2	
					d 10	6	
					e 11	2	
					f 14	8	
						23	Do.
			Raipada ..	X 24–25	a	6	
						18	
			Hukuma.		b	10	
					c	3	
						20	
						19	15th year thinning.
			Raipada ..	I 14–15		12	25th year thinning.
						28	
	Osuro-bandho.	Do.	Pippala-ponka.	XIX 36–37	a 10	10	
					b 13 part	24	
						34	3rd year cleaning.
			Munda-pitta.	VIII 24–25		6	15th year thinning.
						12	

Section 5.—Miscellaneous Prescriptions.

308. *Demarcation.*—The name of each individual part of the annual coupe will be suitably inscribed on stones which will be planted at the prominent corners. The District Forest Officer will decide the number of stones required. For areas below 5 acres in extent one stone should normally suffice. Each stone will indicate the name of the felling series, coupe number, year of working and area, as for example : Kontaipalli Series ; XXVI-a ; 1929–30 ; 18 acres. Owing to the reconstitution of the felling series as well as the resurvey of several worked coupes, the inscriptions found on the old stones are no longer applicable and they should be revised. The correct letters and numbers will be engraved and new stones planted wherever the old ones are found to be unsuitable.

309. *Fire protection.*—The worked coupes will be protected by 15 feet cleared boundary lines which will be fire traced every year. Wherever two or more annual coupes adjoin one another their outer most perimeter alone will be fire traced. But the internal boundary lines will be maintained by the local staff. In the case of isolated areas below 5 acres in extent, their boundary lines need not be fire traced but must be kept in order by the local staff.

310. *Grazing.*—The regenerated coupes will be closed to grazing. The natural III quality sal forest situated within the limits of the demarcated sal blocks will also remain closed to grazing at the discretion of the District Forest Officer.

311. *Quarrying.*—No quarrying will be permitted in the forests belonging to this working circle.

312. *Charcoal burning.*—Charcoal burning may be permitted inside the annual coupes under working and it should be encouraged wherever possible.

Section 6.—Control.

313. *Control Records.*—The prescriptions of the working plan must be correctly controlled and the following control records will be maintained. (*a*) Control Book, (*b*) Record of Works, (*c*) Control Maps and (*d*) Fire Maps. The District Forest Officer will be personally responsible for the accurate posting of all the control records.

314. *Control Book.*—The coppice fellings of each year will be controlled by the Control Book. The prescriptions of the working plan will be entered in the left hand columns and the result of operations in the right hand columns. The entries for each year will be arranged in the order of the felling series. Deviations from the working plan will be briefly noted in the Remarks column with a reference to the sanctioning authority. A true extract from the Control Book applicable to each range will be maintained by the Range Officer. A sample form is given in Appendix IX.

315. *Record of Works.*—All works other than the coppice-fellings will be controlled in the Record of Works. The prescriptions of the working plan entered in the left hand columns will be compared with the result of operations entered in the right hand columns. Measures suggested, and measures carried out though neither suggested nor prescribed will also be shewn. The entries for each year will be made in the order of the felling series. Deviations from the working plan will be briefly explained in the Remarks column, with a reference to the sanctioning authority. An extract from the Record of Works pertaining to each range will be maintained by the Range Officer. A sample form is given in Appendix IX.

316. *Control Maps.*—A complete set of 48 unmounted 4-inch : 1 mile maps will be maintained as the Control Maps in which all the worked coupes will be properly posted up to date.

317. *Fire Maps.*—Fire Maps on the scale of 1 inch to 1 mile will be maintained as prescribed in paragraph 384. The areas burnt in each year will be marked and numbered. In the case of the worked coupes the burnt areas will also be separately marked on neat sketches of 4 inches to 1 mile scale and these sketches should be pasted to the leaves of a blank book. A reference table on the margin will give the number of the fire, date of occurrence, cause of fire, and area burnt.

CHAPTER V.—WORKING PLAN FOR THE SELECTION WORKING CIRCLE.

Section I.—General Constitution of the Circle and Character of the Vegetation.

318. *Area.*—The area of the Selection Working Circle is 246,551 acres distributed among all the seven ranges.

319. *General Constitution.*—The following types of forest constitute the Selection Working Circle :—

	ACS.
Mixed hill forest	159,194
Broken ground of the reserves containing the mixed hill forest	71,667
Unworked III quality plains sal of the reserves containing the mixed hill forest	15,690
Total ..	246,551

The reserves comprising the Selection Working Circle are Baiballi in Russellkonda range, Dhimirijoli, Rambha, Dharpangia and Chokkapad in Majjogoda range, Chandragiri, Ambazora and Gundribadi in Kukuluba range, Brahmansai, Paichalia and Gogodo in Bontha range, Kriamba in Buguda range, Rogoda, Pippalaponka and Bondagocha in Surada range and Pondakhol in Pondakhol range.

320. *General character of the vegetation.*—All the accessible forests have been partially or heavily exploited for the Russellkonda Sawmill during the past decade. Most of the reserves have been overexploited by the extraction of trees down to 3′ 6″ in girth for the benefit of the sawmill. Among the unworked reserves a vast area has been under shifting cultivation or 'Podu' within comparatively recent times, as for example, Pondakhol and Chokkapad and these reserves do not contain mature timber. In the hill forests, sal is present in scattered patches, whilst most of the ground is taken up by inferior species. In moist localities, *Terminalia tomentosa* and *Adina cordifolia* grow to large dimensions. On the hill slopes wherever the soil improves large trees of *Angeissus latifolia* are found. Bamboos, chiefly *Dendrocalamus strictus*, are present in large quantities in the hills. Regeneration of useful species is found if closely looked for, but it is scanty and generally stunted and crooked. The hills are subjected to frequent fires which destroy a good deal of the young regeneration and prevent it from growing into the sapling and the pole stage.

SECTION 2.—DIVISION OF THE AREA.

321. *Felling series.*—According to Mr. Minchin's Working Plan, the reserves containing the selection forests were allotted for exploitation over a period of 20 years from 1920–21 to 1939–40 corresponding to the felling cycle. The annual coupe varied from 9,000 to 18,000 acres and it was located generally in one range. Past experience has shown that it is practically impossible for one Range Officer to cope with the fellings of so unwieldy an area unless assisted by a considerable forest staff. The manner in which the forests were exploited for the sawmill has been discussed in Chapter V of Part I. In order that the selection fellings may be better regulated in the future it is now proposed to constitute the forests of each range as a separate felling series. For this purpose it will be presumed that 10 years of the felling cycle have been gone through from 1920–21 to 1929–30. During the next 10 years the forests that will be allowed complete rest are as follows :—

(i) The reserves which were heavily exploited for the sawmill, viz., Dhimirijoli Rambha, Dharpangia-south, Brahmansai, Kriamba and Rogoda.

(ii) The reserves which were constituted comparatively recently and which were under shifting cultivation at the time of reservation. They are known to contain little timber, viz., Chokkapad and Pondakhol.

(iii) Owing to inaccessibility the central portion of Ambazora reserve, an area of 11,395 acres, will also be excluded from working. The total area of the three classes mentioned above is 155,974 acres.

The forests that will be allotted for working during the next 10 years are as follows :—

(*a*) The reserves which were partially exploited for the sawmill, viz., Baiballi, Dharpangia-north, Chandragiri and Paichalia.

(*b*) The reserves that have not been worked, viz., Ambazora, Gundribadi, Gogodo, Pippalaponka and Bondagocha. The total area of (*a*) and (*b*) is 90,577 acres. The forests of each range fit for working during the next 10 years will be divided into 10 annual coupes as shown below :—

Name of series or range.	Reserve.	Area.	Approximate size of annual coupe.
		ACS.	ACS.
Russellkonda.	Baiballi ..	17,977	1,798
Mojjagoda ..	Dharpangia (north).	6,330	633
Kukuluba ..	Chandragiri ..	14,665	..
	Ambazora ..	17,424	..
	Gundribadi ..	6,141	..
	Total ..	38,230	3,823

Name of series or range.	Reserve.	Area.	Approximate size of annual coupe.
		ACS.	ACS.
Bontha ..	Paichalia ..	8,074	..
	Gogodo ..	9,608	..
	Total ..	17,682	1,768
Surada ..	Pippalaponka.	7,229	..
	Bondagocha ..	3,132	..
	Total ..	10,361	1,036
Total area to be exploited annually ..			9,058

Section 3.—Analysis and Valuation of the Crop.

322. *Stock-mapping.*—During 1928, one of the selection forest reserves, namely, Pippalaponka was taken up for detailed stock-mapping with a view to find out ultimately the area that would be fit for selection fellings. Ten types of forests were distinguished. The mapping engaged two officers for a period of 60 days to complete an area of about 7,000 acres. The results showed that of this large area, only about 350 acres in scattered patches (or 1/20) had sal that could be worked under the selection method. The reserves not exploited for the sawmill and which were to be stock-mapped amounted to a considerable area. The type of stock-mapping contemplated, would have engaged a large staff for a long time and the forest in question is not worth such minute examination. Consequently no such detailed mapping was carried out in the other reserves.

323. *Enumerations.*—Past exploitation for the sawmill gives some indication of the yield that may be expected from the Selection Working Circle. Such yield has varied within wide limits in the different reserves. Dhimirijoli reserve gave a yield per acre of 27 cubic feet of sal and other species from trees of 4′ 6″ in girth and above, Rambha reserve gave a yield per acre of only 12 cubic feet from trees of 4′ 6″ in girth and above. Some reserves were partially exploited and immature trees down to 3′ 6″ in girth had also been removed. The yield from these reserves does not afford any guidance in forecasting the yield of the future. The selection coupes allotted for working during 1930–31 have been enumerated by the district staff. From the results, the probable yield to be expected can be calculated approximately.

Number of trees of 4′ 6″ in girth and above enumerated in the Selection Coupes, allotted for 1930–31.

Range or felling series.	Reserve.	Area.	Seal.	Number of trees under each saleable species.						Estimated value.
				Pterocarpus marsupium.	Adina cordifolia.	Terminalia tomentosa.	Stephegyne parvifolia	Diospyros melanoxylon.	Total number of trees.	
		ACS.								C. FT.
Russellkonda.	Baiballi ..	2,165	82	1	17	66	7	12	185	4,625
Mojjagoda ..	Dharpangia.	749	262	18	5	14	1	1	301	7,525
Kukuluba ..	Chandragiri.	3,841	378	..	22	8	1	5	414	10,350
Bontha ..	Paichalia ..	1,217	398	..	45	71	6	13	533	13,325
Surada ..	Pippala-ponka.	940	5	..	5	50	3	6	69	1,725
	Total ..	8,912	1,125	19	94	209	18	37	1,502	37,550

The total number of trees of sal and other saleable species of 4′ 6″ in girth and above, enumerated is 1,502. A tree may be expected to yield about 25 cubic feet. The total estimated yield per year comes to 37,550 cubic feet.

Section 4.—Method of Treatment.

324. *Choice of species.*—The species to be extracted are sal, *Pterocarpus marsupium, Adina cordifolia, Terminalia tomentosa, Stepyegyne parvifolia* and *Diospyros melanoxylon.* Under the present market conditions there is no demand for other species. But the District Forest Officer will be at liberty to extract any species if experience of fellings shows them to be saleable.

325. *Silvicultural system.*—The forests of this working circle will be worked under the selection system. Regeneration will be from the advance growth already existing on the ground.

326. *Felling cycle.*—The felling cycle will be 20 years. Although exploitation in the past has proceeded in an irregular manner, it will be assumed that 10 years of the felling cycle have already passed from 1920–21 to 1929–30. The balance of the first cycle is therefore 10 years and it coincides with the period of the working plan. During this period the reserves suitable for working in each range will be allotted for fellings.

327. *Exploitable girth.*—The trees available for fellings are of the slow grown hill-side type. According to Mr. Minchin's calculations of the rate of growth of good hill-side sal, an annual girth increment varying from 0·8″ to 0·6″ is put on until the age of 85 years, and thereafter the annual girth increment falls to 0·4″—vide paragraph 184 of Part I. The girth corresponding to the age of 85 years is 5′. Information obtained from past fellings seem to show that the trees can be trusted to remain sound up to a girth between 4′ 6″ and 5′ although it is far from certain that unsoundness commences at any definite size. It would appear that the average quality becomes mature at a girth of 4′ 6″ and is then about 75 years in age. A breast height girth of 4′ 6″ will be fixed arbitrarily as the minimum exploitable girth, *without any elasticity.* This girth is considered to be a sufficient safeguard against over-exploitation in the future. Trees of 4′ 6″ in girth and above will thus be available for selection fellings. Such trees produce the classes of timber which are most in demand. Timber to be saleable at a profit does not need to be entirely sound. When the next felling cycle is resumed at the end of 20 years, it is expected that an appreciable number of undermature trees will increase their girths by about 1′ and pass beyond the minimum exploitable size of 4′ 6″. In other words, a tree of 3′ 6″ in girth will grow to a size of 4′ 6″ and a tree of 4′ in girth will attain a size of 5′. Very little is known of the rate of growth and maturity of species other than sal. But they seem to become mature at a girth between 4′ and 5′. Their exploitable girth will also be fixed at 4′ 6″.

328. *Regulation of the yield.*—The yield will be regulated by area. The annual coupes in each series are definitely marked in the working plan maps. The limits of each coupe are indicated by recognizable boundaries such as cart-tracks, footpaths, streams, crests of hills and other natural features. On the basis of the enumerations carried out in the coupes of 1930–31, the total annual yield is estimated to be 28,125 cubic feet of sal and 9,425 cubic feet of other saleable species. Total, 37,550 cubic feet.

329. *Marking trees.*—Marking trees for felling will be carried out during the cold weather one year ahead of fellings and a detailed extraction scheme will be prepared for each felling series. The extraction scheme will be accompanied by enumeration lists and sketches showing approximately the distribution of the trees, the lines of extraction and the sites of forest depots. The following rules will be observed in the enumeration of trees :—

(1) The minimum exploitable girth will be 4′ 6″ at breast height. No living tree below 4′ 6″ in girth will be marked under any circumstances. Dead trees of any girth may be marked provided they are saleable.

(2) The species to be extracted are sal, *Pterocarpus marsupium, Adina cordifolia, Terminalia tomentosa, Stephegyne parvifolia* and *Diospyros melanoxylon.* Other species may also be marked at the discretion of the District Forest Officer, provided they are found to be saleable.

(3) The annual coupe of each felling series may be divided into a convenient number of natural divisions based on valleys of water-sheds in order to facilitate the enumerations as well as the fellings. The divisions may be called A, B, C, etc., but the trees must be numbered serially for the whole coupe.

(4) Every tree will be marked with two blazes about 6 inches square, one at the foot of the tree and the other at eye-level. Each blaze will then be punched with the serial number of the tree and seal-hammered with the marking officer's seal.

(5) The serial number of the tree, the names of species, girth at breast height and estimated length of saleable bole (which may be taken to a height where the thin end would be about 3′ in girth over bark) will be recorded in an enumeration register. This register will form a permanent record of the District Forest Office.

(6) Where sal advance growth is markedly absent isloated sal mature trees will be retained as seed bearers.

(7) Where sal mature trees happen to be in close proximity, at least one will be retained if advance growth is absent. If advance growth is present there is no silvicultural objection to creating a large gap, since sal is a light demander.

(8) Climbers will be cut on the trees marked while the enumeration is in progress.

(9) The results of enumerations are to be represented in an enumeration map showing the approximate distribution of trees in each division of the coupe, extraction lines, depot sites, etc.

(10) The marking of trees will be carried out by the Range Officer. Not less than 10 cent of the trees marked will be checked by the District Forest Officer or his Gazetted Assistant who should also ensure that the marking has been done completely and correctly.

330. *Felling.*—Fellings will be executed preferably during the rainy weather when the Forest staff is not busy with other silvicultural works. The trees will be felled above the bottom blaze at a height not exceeding 2 feet above ground, so as to reduce the wastage to the minimum. The fall of the tree should be away from the direction in which it will be dragged out. This is particularly important on the hill slopes. No damage should be caused to other standing trees. Felling is usually done by the axe. Trees will be logged and barked at the stump site, so as to produce the best saleable logs. This depends upon a combination of soundness, straightness and length. The popular length is usually 12 to 18 feet. Every log will be punched at the thick end with its serial number, and its measurements of length and mid-girth are to be recorded in the registers prescribed in the Forest Code.

331. *Extraction.*—The logs will be dragged out and stored at convenient centres which are accessible to carts. Such centres may be situated in the forest or outside and will form temporary forest depots until the logs are sold. Dragging is usually done by private buffaloes or bullocks. It will be for the management to decide whether the logs from the remote areas may with advantage be carted to the recognized sale centres where contractors usually congregate. The number of temporary forest depots should be reduced to the minimum in order to facilitate the maintenance of timber accounts. A detailed record will be kept of the number of trees felled and the yield obtained in respect of each species. It is suggested that the extraction should be completed by the end of November and that the sales should be held in January or February.

332. *Regeneration.*—Natural regeneration from advance growth is to be relied upon. Wherever mature sal trees are found in the hill forests, sal advance growth is usually present. But such advance growth is burnt back frequently by fires that rage over the hills every few years. Fire protection would enable the regeneration to grow up into the sapling and pole stage. Although it is almost impossible to exclude fires altogether from the forests every effort must be made to ensure as large a measure of protection as is practicable.

333. *Climber-cutting.*—Climbers will be cut by the beat subordinates as a matter of ordinary duty at all times of the year. No definite programme will be prescribed. But it will be for the District Forest Officer to take such steps as are necessary to enforce this elementary sense of responsibility upon every forest subordinate.

334. *Tabular statement of fellings.*—The annual programme of fellings is given in the following statement :—

Plan of selection felling.

Year.	Felling series.	Range.	Reserve.	Coupe.	Area.
					ACS.
1930–31	Russellkonda	Russellkonda	Baiballi	I	2,165
	Mojjagoda	Mojjagoda	Dharpangia	I	749
	Kukuluba	Kukuluba	Chandragiri	I	3,841
	Bontha	Bontha	Paichalia	I	1,217
	Surada	Surada	Pippalaponka	I	940
				Total	8,912
1931–32	Russellkonda	Russellkonda	Baipalli	II	2,085
	Mojjagoda	Mojjagoda	Dharpangia	II	591
	Kukuluba	Kukuluba	Chandragiri	II	3,689
	Bontha	Bontha	Paichalia	II	2,163
	Surada	Surada	Pippalaponka	II	951
				Total	9,479
1932–33	Russellkonda	Russellkonda	Baiballi	III	1,578
	Mojjagoda	Mojjagoda	Dharpangia	III	598
	Kukuluba	Kukuluba	Chandragiri	III	3,334
	Bontha	Bontha	Paichalia	III	1,764
	Surada	Surada	Pippalaponka	III	1,024
				Total	8,298
1933–34	Russellkonda	Russellkonda	Baiballi	IV	2,421
	Mojjagoda	Mojjagoda	Dharpangia	IV	616
	Kukuluba	Kukuluba	Chandragiri	IV	3,798
	Bontha	Bontha	Paichalia	IV	1,516
	Surada	Surada	Pippalaponka	IV	1,235
				Total	9,586
1934–35	Russellkonda	Russellkonda	Baiballi	V	1,314
	Mojjagoda	Mojjagoda	Dharpangia	V	615
	Kukuluba	Kukuluba	Ambazora	V	4,262
	Bontha	Bontha	Paichalia	V	1,414
	Surada	Surada	Pippalaponka	V	1,064
				Total	8,669
1935–36	Russellkonda	Russellkonda	Baiballi	VI	1,770
	Mojjagoda	Mojjagoda	Dharpangia	VI	596
	Kukuluba	Kukuluba	Ambazora	VI	4,404
	Bontha	Bontha	Gogodo	VI	2,466
	Surada	Surada	Pippalaponka	VI	1,186
				Total	10,422
1936–37	Russellkonda	Russellkonda	Baiballi	VII	1,116
	Mojjagoda	Mojjagoda	Dharpangia	VII	628
	Kukuluba	Kukuluba	Ambazora	VII	4,025
	Bontha	Bontha	Gogodo	VII	2,160
	Surada	Surada	Pippalaponka	VII	829
				Total	8,758
1937–38	Russellkonda	Russellkonda	Baiballi	VIII	1,908
	Mojjagoda	Mojjagoda	Dharpangia	VIII	667
	Kukuluba	Kukuluba	Ambazora	VIII	4,733
	Bontha	Bontha	Gogodo	VIII	2,007
	Surada	Surada	Bondagocha	VIII	1,058
				Total	10,373
1938–39	Russellkonda	Russellkonda	Baiballi	IX	1,906
	Mojjagoda	Mojjagoda	Dharpangia	IX	660
	Kukuluba	Kukuluba	Gundribadi	IX	2,639
	Bontha	Bontha	Gogodo	IX	1,542
	Surada	Surada	Bondagocha	IX	1,122
				Total	7,869
1939–40	Russellkonda	Russellkonda	Baiballi	X	1,714
	Mojjagoda	Mojjagoda	Dharpangia	X	610
	Kukuluba	Kukuluba	Gundribadi	X	3,502
	Bontha	Bontha	Gogodo	X	1,433
	Surada	Surada	Bondagocha	X	952
				Total	8,211

Section 5.—Miscellaneous Prescriptions.

335. *Fire protection.*—The forests are under ' partial protection ' ; their frontier boundary where they adjoin the Zamindaris and Feudatory States or the Agency tracts must be fire-traced annually with a 60-foot line cleared of all growth including trees. Fires from the Zamindari forests are a great menace. The fire tracing of all frontier lines must be completed before the middle of February.

336. *Grazing.*—The forests of this working circle will remain open to grazing.

337. *Quarrying.*—Quarrying will be permitted in the forests comprising this working circle.

Section 6.—Control.

338. *Control records.*—It is of great importance to control correctly the prescriptions of the working plan and the following control records will be maintained : (*a*) Control Book, (*b*) Record of Works, (*c*) Control Maps and (*d*) Fire Maps. The District Forest Officer will be personally responsible for the correct posting of all control records.

339. *Control Book.*—The fellings of the Selection Working Circle will be controlled in the Control Book. The prescriptions of the working plan showing the locality to be exploited will be entered in the left hand columns and the result of operations showing the locality actually exploited, yield, etc., will be entered in the right hand columns. Deviations from the working plan should be briefly explained in the ' Remarks ' column with a reference to the sanctioning authority. An extract from the Control Book pertaining to each range will be maintained by the Range Officer. A sample form is given in Appendix IX.

340. *Record of Works.*—In the Record of Works will be entered all operations carried out in connexion with the exploitation of the coupe, such as marking, climber-cutting, felling, dragging, etc. The prescriptions of the working plan entered in the left hand columns will be compared with the result of operations entered in the right hand columns. Measures suggested and measures carried out though neither suggested nor prescribed will also be shown. Deviations from the working plan should be briefly explained in the ' Remarks ' column with a reference to the sanctioning authority. An extract from the Record of Works applicable to each range will be maintained by the Range Officer. A sample form is given in Appendix IX.

341. *Control Maps.*—A complete set of unmounted 4-inch maps numbering 48 sheets will be maintained as Control Maps which will show the coupes worked in each year.

342. *Fire Maps.*—Fire Maps on 1″ to 1 mile scale will be maintained as prescribed in paragraph 384. The areas burnt in each year will be marked by distinctive signs and numbered. A reference table on the margin will show the number of the fire, date of occurrence, cause of fire and area burnt.

CHAPTER VI.—WORKING PLAN FOR THE FUEL WORKING CIRCLE.

Section 1.—General Constitution of the Circle and Character of the Vegetation.

343. *Area.*—The Fuel Working Circle deals with an area of 98,389 acres.

344. *General Constitution.*—Under the provisions of Mr. Minchin's Working Plan, two working circles, namely, the Lower Hill Fuel Working Circle and the Scrub Jungle Fuel Working Circle, were formed with rotations of 25 and 20 years respectively. In actual working, there has been a certain amount of mingling of the forests of the two working circles and some of the types that were not

originally allotted were worked, as is explained in paragraph 159 of Part I. In future it will be simpler and equally efficient to constitute one working circle called the Fuel Working Circle with a rotation of 25 years. This working circle will include the following classes or forests :—

	ACS.
Minor hill forest	51,170
Scrub jungle	8,150
Broken ground of the reserves containing the minor hill forest and scrub jungle and also of other reserves which are not allotted to the Selection Working Circle.	39,031
Mixed hill forest worked for fuel	38
Total ..	98,389

To meet the local demand for fuel, there is no objection to opening small coupes in the inferior parts of the mixed hill forest and in the better portions of broken ground which are at present allotted to the Selection Working Circle. By so doing, the area of the Fuel Working Circle will increase to a slight extent. Of the total area of the working circle, 3,153 acres have been worked as fuel coupes from 1909–10 to 1929–30. Some of the coupes which were originally included in the Plains Sal Pole Working Circle and subsequently found unsuitable for inclusion in that circle have been added to the Fuel Working Circle. The area of the coupes worked in each range from 1909–10 to 1929–30 is shown below :—

Range.	Reserve.	Area.
		ACS.
Russellkonda ..	Malati	414
	Kaliamba ..	117
	Tiliki	100
	Kullada	120
	Kumarasuni ..	771
	Binodia	142
	Tangarai ..	564
	Sondasolia ..	787
		3,015
Bontha ..	Jaganadprasad ..	58
Buguda ..	Kriamba ..	38
	Kuddapada ..	42
	Total ..	80
	Grand total ..	3,153

345. *General character of the vegetation.*—The minor hill forests are composed of mixed deciduous species of inferior quality and bamboos. The hills are fairly well covered and the species met with are *Terminalia tomentosa, Adina cordifolia, Anogeissus latifolia, Cleistanthus collinus, Diospyros melanoxylon, Bassia latifolia, Odina wodier* and others. The scrub jungle consists of the same species but the growth is extremely poor. The broken ground is open and for the most part is devoid of trees but here and there patches of tree growth are found which are fit to be worked for fuel.

Section 2.—Division of the Area.

346. *Felling series.*—The old felling series have now been reconstituted so as to meet effectively the local demand, and additional felling series are prescribed wherever necessary. The worked coupes allotted to the new felling series are given in Appendix VIII. The forests will be worked for fuel in order to provide the local population with cheap, legitimate means of satisfying their domestic needs. Otherwise petty thefts of firewood are bound to take place by virtue of necessity. The coupes of the Plains Sal Pole Working Circle supply most of the fuel required for local consumption and where such coupes are either insufficient or absent, the District Forest Officer will be at liberty

to open additional felling series in the event of demand arising. The annual coupe may vary from 20 to 50 acres according to demand. The felling series that will now be prescribed are as follows :—

Range.	Felling series.	Reserve.	Size of annual coupe.
			ACS.
Russell-konda.	Malati ..	Malati ..	50
	Kontaipalli.	Kaliamba ..	50
	Gundribadi.	Tiliki ..	50
	Kullada ..	Kullada ..	30
	Kumarasuni East.	Kumarasuni.	25
	Kumarasuni West.	Do.	30
	Binodia ..	Binodia ..	20
	Tangarai East.	Tangarai ..	25
	Tangarai West.	Do. ..	30
Russell-konda —*cont.*	Sondasolia East.	Sondasolia ..	30
	Sondasolia West.	Do.	25
Bontha ..	Jaganad-prasad.	Jaganad-prasad.	50
Buguda ..	Kriamba ..	Kriamba ..	40
	Jhankarai ..	Kurcholi A.	30
	Kuddapada	Kuddapada.	40

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

347. *Analysis of the crop.*—No detailed analysis of the crop has been made in view of its low value and the system of utilization that is in vogue. During the past years, fuel coupes opened in the minor hill forest and broken grounds have fetched prices varying from Rs. 6 to Rs. 38 per acre and the coupes opened in the scrub jungle have fetched prices varying from Rs. 2 to Rs. 12 per acre.

SECTION 4.—METHOD OF TREATMENT.

348. *Choice of species.*—Almost all the natural species are fit for burning as fuel and no preference need be exercised in favour of any particular species.

349. *Silvicultural system.*—The forest will be worked under the simple coppice system.

350. *Rotation.*—The rotation will be 25 years and it is expected to produce trees from 1′ 6″ to 2′ in girth fit for firewood.

351. *Regulation of the yield.*—The yield will be regulated by area. The local demand is limited to an area varying from 20 to 50 acres in each locality. The size of the annual coupe in each felling series is obtained by dividing the area of workable forests in the neighbourhood of groups of villages, by the rotation. The available figures of yield are those furnished by coupe contractors and they are not reliable. Based on such figures for the past three years from 1927–28 to 1929–30, the average yield per acre is expected to be about 102 cubic feet of fuel.

352. *Lay-out and survey of the annual coupe.*—The coupes will be selected at the discretion of the District Forest Officer. As far as possible the annual coupe in each felling series should be laid out in continuation of the previous year's coupe and where this is not possible the locality will be decided by the District Forest Officer according to the demand. Where the felling series run along the slopes of hills the coupes should be selected as high as is accessible up to a height of about 700 feet from the plains level. The coupes will be demarcated by a 6-foot cleared line and then surveyed. (This width will in the following year be enlarged to 10 feet for purposes of fire protection.) The survey must be completed during the cold weather. The area of the coupe will be rounded off to the nearest acre.

353. *Coppice felling.*—The system of working the coupes through the agency of contractors can continue. If in any year coupes cannot be sold, it will not be incumbent upon the District Forest Officer to work such coupes departmentally. The sales will be held in May and the contractor may be granted a voidah of one year commencing from the 1st July, for the removal of the produce. Before a contractor is permitted to fell a coupe, the trees along the outer edge of the coupe line will be hammer-marked at intervals of about 1

chain, with the Range Officer's seal, to prevent encroachments into the forest. The following felling rules must be observed :—

(1) All trees and shrubs will be cut close to the ground and the stools of the trees trimmed.

(2) *Mangifera indica* and *Ficus* trees may be felled at the option of the contractor.

(3) Bamboo clumps may not be clear-felled, but useful culms may be cut and removed.

354. *Regeneration.*—Regeneration of the coupe is from the coppiced stools. The contractor vacates the coupe at the end of June and till then he and his men are in and about the area. The new crop may be said to date from the beginning of July.

355. *Tabular statement of fellings and regeneration.*—In the following statement is given the annual programme of coppice fellings and regeneration in all the felling series :—

Plan of Coppice Felling and Regeneration.

Year.	Range.	Felling series.	Reserve.	Coupe.	Area.
					ACS.
1930–31	Russellkonda	Malati	Malati	IX	50
		Kontaipalli	Kaliamba	IV	50
		Gundribadi	Tiliki	III	50
		Kullada	Kullada	V	30
		Kumarasuni East	Kumarasuni	XI	25
		Kumarasuni West.	Do.	VII	30
		Binodia	Binodia	V	20
		Tangarai East	Tangarai	VIII	25
		Tangarai West	Do.	IX	30
		Sondasolia East	Sondasolia	X	30
		Sondasolia West	Do.	XI	25
	Bontha	Jaganadprasad	Jaganadprasad	II	50
	Buguda	Kriamba	Kriamba	II	40
		Jhankarai	Kurcholi A	I	30
		Kuddapada	Kuddapada	II	40
1931–32	Russellkonda	Malati	Malati	X	50
		Kontaipalli	Kaliamba	V	50
		Gundribadi	Tiliki	IV	50
		Kullada	Kullada	VI	30
		Kumarasuni East	Kumarasuni	XII	25
		Kumarasuni West	Do.	VIII	30
		Binodia	Binodia	VI	20
		Tangarai East	Tangarai	IX	25
		Tangarai West	Do.	X	30
		Sondasolia East	Sondasolia	XI	30
		Sondasolia West	Do.	XII	25
	Bontha	Jaganadprasad	Jaganadprasad	III	50
	Buguda	Kriamba	Kriamba	III	40
		Jhankarai	Kurcholi A	II	30
		Kuddapada	Kaddapada	III	40
1932–33	Russellkonda	Malati	Malati	XI	50
		Kontaipalli	Kaliamba	VI	50
		Gundribadi	Tiliki	V	50
		Kullada	Kullada	VII	30
		Kumarasuni East	Kumarasuni	XIII	25
		Kumarasuni West.	Do.	IX	30
		Binodia	Binodia	VII	20
		Tangarai East	Tangarai	X	25
		Tangarai West	Do.	XI	30
		Sondasolia East	Sondasolia	XII	30
		Sondasolia West	Do.	XIII	25
	Bontha	Jaganadprasad	Jaganadprasad	IV	50
	Buguda	Kriamba	Kriamba	IV	40
		Jhankarai	Kurcholi A	III	30
		Kuddapada	Kuddapada	IV	40
1933–34	Russellkonda	Malati	Malati	XII	50
		Kontaipalli	Kaliamba	VII	50
		Gundribadi	Tiliki	VI	50
		Kullada	Kullada	VIII	30
		Kumarasuni East	Kumarasuni	XIV	25
		Kumarasuni West.	Do.	X	30
		Binodia	Binodia	VIII	20
		Tangarai East	Tangarai	XI	25
		Tangarai West	Do.	XII	30
		Sondasolia East	Sondasolia	XIII	30
		Sondasolia West	Do.	XIV	25
	Bontha	Jaganadprasad	Jaganadprasad	V	50
	Buguda	Kriamba	Kriamba	V	40
		Jhankarai	Kurcholi A	IV	30
		Kuddapada	Kuddapada	V	40
1934–35	Russellkonda	Malati	Malati	XIII	50
		Kontaipalli	Kaliamba	VIII	50
		Gundribadi	Tiliki	VII	50

Year.	Range.	Felling series.	Reserve.	Coupe.	Area.
					ACS.
1934–35—*cont.*	Russellkonda—*cont.*	Kullada	Kullada	IX	30
		Kumarasuni East	Kumarasuni	XV	25
		Kumarasuni West.	Do.	XI	30
		Binodia	Binodia	IX	20
		Tangarai East	Tangarai	XII	25
		Tangarai West	Do.	XIII	30
		Sondasolia East	Sondasolia	XIV	30
		Sondasolia West	Do.	XV	25
	Bontha	Jaganadprasad	Jaganadprasad	VI	50
	Buguda	Kriamba	Kriamba	VI	40
		Jhankarai	Kurcholi A	V	30
		Kuddapada	Kuddapada	VI	40
1935–36	Russellkonda	Malati	Malati	XIV	50
		Kontaipalli	Kaliamba	IX	50
		Gundribadi	Tiliki	VIII	50
		Kullada	Kullada	X	30
		Kumarasuni East	Kumarasuni	XVI	25
		Kumarasuni West.	Do.	XII	30
		Binodia	Binodia	X	20
		Tangarai East	Tangarai	XIII	25
		Tangarai West	Do.	XIV	30
		Sondasolia East	Sondasolia	XV	30
		Sondasolia West	Do.	XVI	25
	Bontha	Jaganadprasad	Jaganadprasad	VII	50
	Buguda	Kriamba	Kriamba	VII	40
		Jhankarai	Kurcholi A	VI	30
		Kuddapada	Kuddapada	VII	40
1936–37	Russellkonda	Malati	Malati	XV	50
		Kontaipalli	Kaliamba	X	50
		Gundribadi	Tiliki	IX	50
		Kullada	Kullada	XI	30
		Kumarasuni East	Kumarasuni	XVII	25
		Kumarasuni West.	Do.	XIII	30
		Binodia	Binodia	XI	20
		Tangarai East	Tangarai	XIV	25
		Tangarai West	Do.	XV	30
		Sondasolia East	Sondasolia	XVI	30
		Sondasolia West	Do.	XVII	25
	Bontha	Jaganadprasad	Jaganadprasad	VIII	50
	Buguda	Kriamba	Kriamba	VIII	40
		Jhankarai	Kurcholi A	VII	30
		Kuddapada	Kuddapada	VIII	40
1937–38	Russellkonda	Malati	Malati	XVI	50
		Kontaipalli	Kaliamba	XI	50
		Gundribadi	Tiliki	X	50
		Kullada	Kullada	XII	30
		Kumarasuni East	Kumarasuni	XVIII	25
		Kumarasuni West.	Do.	XIV	30
		Binodia	Binodia	XII	20
		Tangarai East	Tangarai	XV	25
		Tangarai West	Do.	XVI	30
		Sondasolia East	Sondasolia	XVII	30
		Sondasolia West	Do.	XVIII	25
	Bontha	Jaganadprasad	Jaganadprasad	IX	50
	Buguda	Kriamba	Kriamba	IX	40
		Jhankarai	Kurcholi A	VIII	30
		Kuddapada	Kuddapada	IX	40
1938–39	Russellkonda	Malati	Malati	XVII	50
		Kontaipalli	Kaliamba	XII	50
		Gundribadi	Tiliki	XI	50
		Kullada	Kullada	XIII	30
		Kumarasuni East	Kumarasuni	XIX	25
		Kumarasuni West.	Do.	XV	30
		Binodia	Binodia	XIII	20
		Tangarai East	Tangarai	XVI	25
		Tangarai West	Do.	XVII	30
		Sondasolia East	Sondasolia	XVIII	30
		Sondasolia West	Do.	XIX	25
	Bontha	Jaganadprasad	Jaganadprasad	X	50
	Buguda	Kriamba	Kriamba	X	40
		Jhankarai	Kurcholi A	IX	30
		Kuddapada	Kuddapada	X	40
1939–40	Russellkonda	Malati	Malati	XVIII	50
		Kontaipalli	Kaliamba	XIII	50
		Gundribadi	Tiliki	XII	50
		Kullada	Kullada	XIV	30
		Kumarasuni East	Kumarasuni	XX	25
		Kumarasuni West.	Do.	XVI	30
		Binodia	Binodia	XIV	20
		Tangarai East	Tangarai	XVII	25
		Tangarai West	Do.	XVIII	30
		Sondasolia East	Sondasolia	XIX	30
		Sondasolia West	Do.	XX	25
	Bontha	Jaganadprasad	Jaganadprasad	XI	50
	Buguda	Kriamba	Kriamba	XI	40
		Jhankarai	Kurcholi A	X	30
		Kuddapada	Kuddapada	XI	40

Section 5.—Miscellaneous Prescriptions.

356. *Demarcation.*—Each worked coupe will be demarcated by slab stones indicating the name of the working circle, felling series, coupe number, year of working and area as for example, F.W.C. Malati Series VIII, 1929–30, 51 acs. Owing to the reconstitution of most of the felling series, the inscriptions found on the old stones are no longer suitable and they will be corrected wherever necessary.

357. *Fire protection.*—The perimeter of the worked coupes will be fire-traced annually to a width of 10 feet for a period of three years after felling. Thereafter, the line will be kept cleared by the local staff. The fire-tracing of the boundary lines affords protection to the crop in its early life and facilitates the subsequent maintenance of the boundary lines by the subordinates.

358. *Grazing.*—Worked coupes will be temporarily closed to grazing for a period of five years after felling.

359. *Quarrying.*—No quarrying will be permitted in the worked coupes.

360. *Charcoal burning.*—In the coupes under working, charcoal burning may be permitted at the discretion of the District Forest Officer.

Section 6.—Control.

361. *Control records.*—The following Control records will be maintained to control the prescriptions of the working plan, (*a*) Control Book, (*b*) Record of Works, (*c*) Control Maps and (*d*) Fire Maps. The District Forest Officer will be personally responsible for the correct posting of all control records.

362. *Control Book.*—The coppice fellings of each year shall be controlled in the Control Book. The prescriptions of the working plan entered in the left hand columns will be compared with the result of operations entered in the right hand columns. Deviations from the working plan should be briefly explained in the 'Remarks' column with a reference to the sanctioning authority. An extract from the Control Book applicable to each range will be maintained by the Range Officer. A sample form is given in Appendix IX.

363. *Record of Works.*—All works other than coppice fellings will be recorded in the Record of Works. In this form will also be shewn measures suggested in the working plan and measures neither suggested nor prescribed but carried out. Each Range Officer will maintain an extract applicable to his range. A sample form is given in Appendix IX.

364. *Control Maps.*—A complete set of unmounted 4 inch maps will be maintained as the Control Maps in which the worked coupes will be correctly posted up to date.

365. *Fire Maps.*—Fire Maps on the scale of one inch to one mile will be maintained as prescribed in paragraph 384.

CHAPTER VII.—WORKING PLAN FOR THE BAMBOO WORKING CIRCLE.

366. *Area.*—The area of the Bamboo Working Circle is 79,792 acres and it is distributed among all the seven ranges.

367. *General constitution of the circle and character of the vegetation.*—The Bamboo Working Circle overlaps the forests of the Plains Sal Timber Working Circle and of the Ravine, Plains Sal Pole Selection and Fuel Working Circles. Bamboo is present in abundant quantities in almost all reserves but the demand is limited to the modest needs of the local inhabitants. Wherever there is demand, felling series have been arranged in the vicinity of groups of villages. The working circle will for the present consist of 23 felling series having an area of 79,792 acres. If demand increases, there is scope for expanding the working circle. The two species of bamboo growing in the forests are *Dendrocalamus strictus* and *Bambusa arundinacea*. The former is distributed in large quantities

over the hill slopes and the latter occurs in scattered patches beside stream banks. The growth of bamboo is comparatively poor in the minor hill forests and the scrub jungle.

368. *Silvicultural system.*—The system of working will be felling selected culms from the clumps.

369. *Felling cycle.*—The felling cycle will vary from three to five years according to the extent of bamboo-bearing area available around the centres of demand.

370. *Method of treatment—Felling series.*—During the past ten years, 17 felling series were being worked partly or fully. These series have now been reconstituted and additional series have been formed wherever there is likelihood of local demand. There will be 23 felling series and the annual coupes comprising each felling series are definitely marked on the working plan maps. The coupes are formed with recognizable natural features as boundaries. Their limits are generally cart-tracks, foot-paths, streams, crests of hills, etc. The coupes contain a variable extent of bamboo-bearing area. There is no need for demarcating them by cut lines or for surveying them. The present method of selling the annual coupes to contractors can continue. Sales will be held in May, and a ' voidah ' of one year commencing from the 1st of July may be granted for the removal of produce. If the annual coupes of any series cannot be sold, it will not be incumbent upon the District Forest Officer to work the coupes by any other method. In the event of demand arising in areas other than those contemplated in this working plan, the District Forest Officer will be at liberty to select suitable areas and form additional felling series. Within the limits of the bamboo coupe, extraction of bamboo will be permissible from all localities except the worked coupes of the Plains Sal Timber, Ravine and Pole Working Circles as well as the coupes actually under working in the Fuel Working Circle. Regeneration springs up naturally from the underground rhizomes. Under the present conditions of working, no special silvicultural rules are necessary to protect the bamboos and therefore none are prescribed. The following is a statement of the number of felling series prescribed in each range.—

Range.	Felling series.	Reserve.	Area.	Felling cycle.	Average size of annual coupe.
			ACS.		ACS.
Russellkonda	Kaliamba-Tiliki ..	Kaliamba	7,178		
		Tiliki	7,368		
		Total ..	14,546	4	3,637
	Kullada	Kullada	2,292	4	573
	Malati	Malati	1,504	4	376
	Kumarasuni	Kumarasuni	2,697	4	674
	Tangarai	Tangarai	2,019	4	505
	Sondasolia	Sondasolia	2,095	4	524
Mojjagoda	Siddapodaro	Galleri	7,384	5	1,477
	Rambha	Rambha	3,566	4	892
	Dhimirijoli	Dhimirijoli	1,310	3	437
Kukuluba	Lembhai	Chandragiri	2,234	4	559
	Kattachira	Do. ..	2,826	4	707
Bontha	Koladharo	Jaganadprasad ..	798	4	200
	Jaganadprasad ..	Do. ..	1,330	4	333
	Allamada	Do. ..	3,051	4	763
	Manopuru	Brahmansai	1,820	4	455
	Nabagocha	Paichalia	963	4	241
Buguda	Kurcholi	Kurcholi A	3,440	4	860
	Budikhollo	Kriamba	2,499	4	625
Surada	Rogoda	Rogoda	7,134	5	1,427
	Vinjigiri	Vinjigiri	3,482	5	696
	Raipada	Raipada	6,427	5	1,285
	Pippalaponka ..	Pippalaponka ..	2,436	4	609
Pondakhol	Gazilbadi	Pondakhol	3,939	4	985

371. *Tabular statement of fellings.*—The annual programme of fellings in all the felling series is given in the following statement.

Plan of Felling.

Year.	Range.	Felling series.	Reserve.	Coupe.	Area.
					Acs.
1930–31	Russellkonda	Kaliamba-Tiliki	Kaliamba	I	3,493
		Kullada	Kullada	I	645
		Malati	Malati	I	365
		Kumarosuni	Kumarosuni	I	628
		Tangarai	Tangarai	I	580
		Sondasolia	Sondasolia	I	614
	Mojjagoda	Siddapodaro	Galleri	I	794
		Rambha	Rambha	I	890
		Dimirijoli	Dhimirijoli	III	389
	Kukuluba	Lembhai	Chandragiri	I	496
		Kattachira	Do.	I	1,120
	Bontha	Koladharo	Jaganadprasad	I	184
		Jaganadprasad	Do.	I	330
		Allamada	Do.	I	756
		Manopuru	Brahmansai	I	336
		Nabagocha	Paichalia	I	236
	Buguda	Kurcholi	Kurcholi A	IV	930
		Budikhollo	Kriamba	I	585
	Surada	Rogoda	Rogoda	I	1,109
		Vinjigiri	Vinjigiri	I	480
		Raipada	Raipada	I	1,161
		Pippalaponka	Pippalaponka	I	565
	Pondakhol	Gazilbadi	Pondakhol	II	730
				Total	17,416
1931–32	Russellkonda	Kaliamba-Tiliki	Kaliamba	II	3,685
		Kullada	Kullada	II	596
		Malati	Malati	II	364
		Kumarosuni	Kumarosuni	II	675
		Tangarai	Tangarai	II	466
		Sondasolia	Sondasolia	II	538
	Mojjagoda	Siddapodaro	Galleri	II	1,670
		Rambha	Rambha	II	826
		Dhimirijoli	Dhimirijoli	I	506
	Kukuluba	Lembhai	Chandragiri	II	750
		Kattachira	Do.	II	676
	Bontha	Koladharo	Jaganadprasad	II	214
		Jaganadprasad	Do.	II	200
		Allamada	Do.	II	746
		Manopuru	Brahmansai	II	386
		Nabagocha	Paichalia	II	316
	Buguda	Kurcholi	Kurcholi A	I	990
		Budikhollo	Kriamba	II	687
	Surada	Rogoda	Rogoda	II	1,584
		Vinjigiri	Vinjigiri	II	563
		Raipada	Raipada	II	1,214
		Pippalaponka	Pippalaponka	II	754
	Pondakhol	Gazilbadi	Pondakhol	III	1,175
				Total	1,9581
1932–33	Russellkonda	Kaliamba-Tiliki	Tiliki	III	3,508
		Kullada	Kullada	III	426
		Malati	Malati	III	265
		Kumarosuni	Kumarosuni	III	718
		Tangarai	Tangarai	III	421
		Sondasolia	Sondasolia	III	420
	Mojjagoda	Siddapodaro	Galleri	III	2,002
		Rambha	Rambha	III	958
		Dhimirijoli	Dhimirijoli	II	415
	Kukuluba	Lembhai	Chandragiri	III	492
		Kattachira	Do.	III	482
	Bontha	Koladharo	Jaganadprasad	III	155
		Jaganadprasad	Do.	III	350
		Allamada	Do.	III	834
		Manopuru	Brahmansai	III	410
		Nabagocha	Paichalia	III	207
	Buguda	Kurcholi	Kurcholi A	II	740
		Budikhollo	Kriamba	III	597
	Surada	Rogoda	Rogoda	III	972
		Vinjigiri	Vinjigiri	III	650
		Raipada	Raipada	III	1,638
		Pippalaponka	Pippalaponka	III	520
	Pondakhol	Gazilbadi	Pondakhol	IV	1,284
				Total	18,464
1933–34	Russellkonda	Kaliamba-Tiliki	Tiliki	IV	3,860
		Kullada	Kullada	IV	625
		Malati	Malati	IV	510
		Kumarosuni	Kumarosuni	IV	676
		Tangarai	Tangarai	IV	552
		Sondasolia	Sondasolia	IV	523

Plan of Felling—cont.

Year.	Range.	Felling series.	Reserve.	Coupe.	Area. ACS.
1933–34—*cont.*	Mojjagoda ..	Siddapodaro ..	Gahleri	IV	1,056
		Rambha	Rambha	IV	892
		Dhimirijoli ..	Dhimirijoli ..	III	389
	Kukuluba ..	Lembhai	Chandragiri ..	IV	496
		Kattachira ..	Do. ..	IV	548
	Bontha ..	Koladharo	Jaganadprasad ..	IV	245
		Jaganadprasad ..	Do. ..	IV	450
		Allamada	Do. ..	IV	715
		Manopuru	Brahmansai ..	IV	688
		Nabagocha ..	Paichalia	IV	204
	Buguda ..	Kurcholi	Kurcholi A ..	III	780
		Budikhollo ..	Kriamba	IV	630
	Surada ..	Rogoda	Rogoda	IV	2,073
		Vinjigiri	Vinjigiri	IV	842
		Raipada	Raipada	IV	1,316
		Pippalaponka ..	Pippalaponka ..	IV	597
	Pondakhol ..	Gazilbadi	Pondakhol	I	750
				Total ..	19,417
1924–35 ..	Russellkonda ..	Kaliamba-Tiliki ..	Kaliamba	I	3,493
		Kullada	Kullada	I	645
		Malati	Malati	I	365
		Kumarosuni ..	Kumarosuni ..	I	628
		Tangarai	Tangarai	I	580
		Sondasolia	Sondasolia	I	614
	Mojjagoda ..	Siddapodaro ..	Galleri	V	1,862
		Rambha	Rambha	I	890
		Dhimirijoli ..	Dhimirijoli ..	I	506
	Kukuluba ..	Lembhai	Chandragiri ..	I	496
		Kattachira ..	Do. ..	I	1,120
	Bontha ..	Koladharo	Jaganadprasad ..	I	184
		Jaganadprasad ..	Do. ..	I	330
		Allamada	Do. ..	I	756
		Manopuru	Brahmansai ..	I	336
		Nabagocha ..	Paichalia	I	236
	Buguda ..	Kurcholi	Kurcholi A ..	IV	930
		Budikhollo ..	Kriamba	I	585
	Surada ..	Rogoda	Rogoda	V	1,396
		Vinjigiri	Vinjigiri	V	947
		Raipada	Raipada	V	1,098
		Pippalaponka ..	Pippalaponka ..	I	565
	Pondakhol ..	Gazilbadi	Pondakhol	II	730
				Total ..	19,292
1935–36 ..	Russellkonda ..	Kaliamba-Tiliki ..	Kaliamba	II	3,685
		Kullada	Kullada	II	596
		Malati	Malati	II	364
		Kumarosuni ..	Kumarosuni ..	II	675
		Tangarai	Tangarai	II	466
		Sondasolia	Sondasolia	II	538
	Mojjagoda ..	Siddapodaro ..	Galleri	I	794
		Rambha	Rambha	II	826
		Dhimirijoli ..	Dhimirijoli ..	II	415
	Kukuluba ..	Lembhai	Chandragiri ..	II	750
		Kattachira ..	Do. ..	II	676
	Bontha ..	Koladharo	Jaganadprasad ..	II	214
		Jaganadprasad ..	Do. ..	II	200
		Allamada	Do. ..	II	746
		Manaporu	Brahmansai ..	II	386
		Nabagocha ..	Paichalia	II	316
	Buguda ..	Kurcholi	Kurcholi A ..	I	990
		Budikhollo ..	Kriamba	II	687
	Surada ..	Rogoda	Rogoda	I	1,109
		Vinjigiri	Vinjigiri	I	480
		Raipada	Raipada	I	1,161
		Pippalaponka ..	Pippalaponka ..	II	754
	Pondakhol ..	Gazilbadi	Pondakhol	III	1,175
				Total ..	18,003
1936–37 ..	Russellkonda ..	Kaliamba-Tiliki ..	Tiliki	III	3,508
		Kullada	Kullada	III	426
		Malati	Malati	III	265
		Kumarosuni ..	Kumarosuni	III	718
		Tangarai	Tangarai	III	421
		Sondasolia	Sondasolia	III	420
	Mojjagoda ..	Siddapodaro ..	Galleri	II	1,670
		Rambha	Rambha	III	958
		Dhimirijoli ..	Dhimirijoli	III	389
	Kukuluba ..	Lembhai	Chandragiri	III	492
		Kattachira ..	Do. ..	III	482

Plan of Felling—cont.

Year.	Range.	Felling series.	Reserve.	Coupe.	Area. ACS.
1936–37—*cont.*	Bontha	Koladharo	Jaganadprasad ..	III	155
		Jaganadprasad ..	Do. ..	III	350
		Allamuda	Do. ..	III	834
		Manopuru	Brahmansai	III	410
		Nabagocha ..	Paichalia	III	207
	Buguda	Kurcholi	Kurcholi A	II	740
		Budikhollo ..	Kriamba	III	597
	Surada	Rogoda	Rogoda	II	1,584
		Vinjigiri	Vinjigiri	II	563
		Raipada	Raipada	II	1,214
		Pippalaponka ..	Pippalaponka	III	520
	Pondakhol	Gazilbadi	Pondakhol	IV	1,285
				Total ..	18,208
1937–38 ..	Russellkonda ..	Kaliamba-Tiliki ..	Tiliki	IV	3,860
		Kullada	Kullada	IV	625
		Malati	Malati	IV	510
		Kumarosuni ..	Kumarosuni	IV	676
		Tangarai	Tangarai	IV	552
		Sondasolia	Sondasolia	IV	523
	Mojjagoda	Siddapodaro ..	Galleri	III	2,002
		Rambha	Rambha	IV	892
		Dhimirijoli ..	Dhimirijoli	I	506
	Kukuluba	Lembhai	Chandragiri	IV	496
		Kattachira ..	Do. ..	IV	548
	Bontha	Koladharo	Jaganadprasad ..	IV	245
		Jaganadprasad ..	Do. ..	IV	450
		Allamuda	Do. ..	IV	715
		Manopuru	Brahmansai	IV	688
		Nabagocha ..	Paichalia	IV	204
	Buguda	Kurcholi	Kurcholi A	III	780
		Budikhollo ..	Kriamba	IV	630
	Surada	Rogoda	Rogoda	III	972
		Vinjigiri	Vinjigiri	III	650
		Raipada	Raipada	III	1,638
		Pippalaponka ..	Pippalaponka ..	IV	597
	Pondakhol	Gazilbadi	Pondakhol	I	750
				Total ..	19,509
1938–39 ..	Russellkonda ..	Kaliamba-Tiliki ..	Kaliamba	I	3,493
		Kullada	Kullada	I	645
		Malati	Malati	I	365
		Kumarosuni ..	Kumarosuni	I	628
		Tangarai	Tangarai	I	580
		Sondasolia	Sondasolia	I	614
	Mojjagoda	Siddapodaro ..	Galleri	IV	1,056
		Rambha	Rambha	I	890
		Dhimirijoli ..	Dhimirijoli	II	415
	Kukuluba	Lembhai	Chandragiri	I	496
		Kattachira ..	Do. ..	I	1,120
	Bontha	Koladharo	Jaganadprasad ..	I	184
		Jaganadprasad ..	Do. ..	I	330
		Allamuda	Do. ..	I	756
		Manopuru	Brahmansai	I	336
		Nabagocha ..	Paichalia	I	236
	Buguda	Kurcholi	Kurcholi A	IV	930
		Budikhollo ..	Kriamba	I	585
	Surada	Rogoda	Rogoda	IV	2,073
		Vinjigiri	Vinjigiri	IV	842
		Raipada	Raipada	IV	1,316
		Pippalaponka ..	Pippalaponka ..	I	565
	Pondakhol	Gazilbadi	Pondakhol	II	730
				Total ..	19,185
1939–40 ..	Russellkonda ..	Kaliamba-Tiliki ..	Kaliamba	II	3,685
		Kullada	Kullada	II	596
		Malati	Malati	II	364
		Kumarosuni ..	Kumarosuni	II	675
		Tangarai	Tangarai	II	466
		Sondasolia	Sondasolia	II	538
	Mojjagoda	Siddapodaro ..	Galleri	V	1,862
		Rambha	Rambha	II	826
		Dhimirijoli ..	Dhimirijoli	III	389

Plan of Felling—cont.

Year.	Range.	Felling series.	Reserve.	Coupe.	Area. ACS.
1939–40—*cont.*	Kukuluba	Lembhai	Chandragiri	II	750
		Kattachira ..	Do.	II	676
	Bontha	Koladharo	Jaganadprasad ..	II	214
		Jaganadprasad ..	Do. ..	II	200
		Allamuda	Do. ..	II	746
		Monopuru	Brahmansai	II	386
		Nabagocha ..	Paichalia	II	316
	Buguda	Kurcholi	Kurcholi A	I	990
		Budikhollo ..	Kriamba	II	687
	Surada	Rogoda	Rogoda	V	1,396
		Vinjigiri	Vinjigiri	V	947
		Raipada	Raipada	V	1,098
		Pippalaponka ..	Pippalaponka ..	II	754
	Pondakhol	Gazilbadi	Pondakhol	III	1,175
				Total ..	19,736

372. *Control.*—The Control Book will control the fellings in this working circle. The prescriptions of the working plan entered in the left hand columns will be compared with the result of operations entered in the right hand columns. Deviations from the working plan should be briefly explained in the ' Remarks ' column with a reference to the sanctioning authority. A true extract from the Control Book applicable to each range will be maintained by the Range Officer. The coupes worked in each year will be posted on the 4-inch Control Maps. Fire Maps on the scale of 1 inch to 1 mile will be maintained as prescribed in paragraph 384.

CHAPTER VIII.—WORKING PLAN FOR THE MINOR PRODUCE WORKING CIRCLE.

373. *Area and constitution of the Working Circle.*—The Minor Produce Working Circle covers the whole area dealt with by this plan.

374. *Lease of minor forest produce.*—The minor forest produce is mostly enjoyed by the Kondhs as a free concession. There is no appreciable demand for any produce except the bark of *Cassia fistula* (Rela) which is used locally for tanning purposes. Other kinds of produce sold to a small extent on permits are fibre, thatching grass, rough and cut stones, lime stone, metal, and gravel. The right to collect the bark of *Cassia fistula* will be leased out annually by ranges in accordance with the following programme based on a 5-year rotation :—

Year.	Range including reserves and unreserves.	Year.	Range including reserves and unreserves.
1930–31 ..	Mojjagoda and Kukuluba.	1935–36 ..	Mojjagoda and Kukuluba.
1931–32 ..	Surada.	1936–37 ..	Surada.
1932–33 ..	Pondhakhol.	1937–38 ..	Pondhakhol.
1933–34 ..	Bontha and Buguda.	1938–39 ..	Bontha and Buguda.
1934–35 ..	Russellkonda.	1939–40 ..	Russellkonda.

It will be left to the District Forest Officer to take such steps as are necessary to stimulate a trade in any other class of produce. But it is undesirable to interfere with the concessions enjoyed by the local Kondhs who collect for their food edible produce, such as mango, arrowroot, honey, etc.

375. *Control.*—The lease of the minor produce, the revenue realized, figures of yield furnished by contractors, etc., will be recorded in the Control Book. A sample form is given in Appendix IX.

CHAPTER IX.—WORKING PLAN FOR THE GRAZING WORKING CIRCLE.

376. *Area and constitution of the working circle.*—The Grazing Working Circle includes the whole of the area under this working plan except (*a*) Plains Sal Timber Working Circle, (*b*) the III quality natural forests within the demarcated sal blocks, (*c*) the worked coupes of the Ravine Working Circle and of the Plains Sal Pole Working Circle. The worked coupes of the Fuel Working Circle will be temporarily closed to grazing for a period of five years after felling. There is not very much demand for grazing in the forest. Cattle are taken into the reserves only at certain times of the year when the pasture in the unreserves and paddy fields become diminished. Buffaloes, cows, bullocks and sheep graze in the reserves and their number varies from 40,000 to 44,000. Goats are rigidly excluded from the reserved forests. The area at present open to grazing is some 339,300 acres and the grazing incidence is at the rate of one 'cow unit' per six acres, assuming that one buffalo is equivalent to two cows and that one cow is equivalent to two sheep. In the better class sal forests, cattle are capable of doing a considerable amount of injury. They browse on sal regeneration and the plants which are continuously browsed become weakened and soon die off. The cattle, by the constant trampling of the ground cause the hardening of the surface soil and produce conditions which are inimical to the establishment of natural regeneration. The District Forest Officer will therefore be at liberty to close to grazing any additional areas in the III quality plains sal forest or ravine sal forest where, owing to heavy grazing, sal advance growth is markedly scanty.

377. *Issue of grazing permits.*—Each range is treated as a grazing unit and permits will be issued for the range as a whole. The permit is valid for one year commencing from the 1st of July. The grazing fees will continue to be six annas for buffaloes, three annas for cows or bullocks and one anna six pies for sheep. The annual grazing revenue is about Rs. 9,500. The Kondhs residing in the hamlets of Chokkapad reserve have the right of free grazing except as regards goats. Other Kondhs living in the neighbourhood of reserved forests are allowed free grazing as a concession up to the limit of six head of cattle per house.

378. *Control.*—The number and kind of cattle grazed in the reserves, the grazing revenue realized, the area opened and closed to grazing will be recorded in the Control Book. A sample form is given in Appendix IX.

CHAPTER X.—MISCELLANEOUS REGULATIONS.

SECTION 1.—FIRE PROTECTION.

379. *Burning fire lines.*—The different kinds of fire lines have already been dealt with under each working circle. The clearing of fire lines shall commence on the 1st of November. A guide line shall be cut on either side of the fire line. The width of the guide line will be about three feet on the 15-foot lines and about ten feet on the 60-foot lines. The whole width of the line shall then be cleared of all growth including trees. The cut material shall be arranged evenly along the middle of the line and left to dry. The burning of lines will commence in the 1st week of January. The burning shall proceed from either side of the fire lines towards the middle and from one end to the other, under the direct supervision of a forest subordinate. As burning progresses, two men shall keep watch from either side of the line and guide the

fire as it travels. Care should be taken that the fire does not under any circumstances escape into the adjacent forest. A second burning shall be done wherever a good burn has not been obtained in the first instance. The burning of all fire lines should be completed not later than the 15th of February. The forest becomes inflammable after the middle of February and is exposed to the risk of fires. It is therefore important that the fire tracing of all lines should be completed before the middle of February. Special fire patrols shall be employed for a period of four months from the 15th of February to the 15th of June or until the first break of the monsoon. The number of fire patrols required for each range shall be decided by the District Forest Officer.

380. *Fire occurrence reports.*—Whenever a fire is detected within the area of a reserved forest, the beat subordinate shall immediately collect the local Kondhs and other villagers and extinguish the fire. If there is any likelihood of the fire growing out of control, the beat subordinate shall at once intimate to the Range Officer who shall without the least delay take such measures as are necessary to put down the fire. The Range Officer should inspect the area burnt, ascertain the cause of the fire, if possible, and submit to the Extra Assistant Conservator of Forests, a Fire Occurrence Report in the prescribed form with a sketch showing the area actually burnt. The report should be submitted not later than within one week of the date of occurrence of the fire.

381. *Reduction of the fire lines.*—The estimate for the fire season of 1930 shows the following expenditure to be incurred on the fire protection operations.

Range.	Length of fire lines.			Cost of fire protection.
	M.	F.	CH.	RS.
Russellkonda	165	2	6	940
Mojjagoda	186	5	0	1,235
Kukuluba	125	6	5	1,128
Bontha	87	0	0	720
Buguda	135	5	6	827
Surada	188	2	0	1,380
Pondakhol	183	1	4	907
Total ..	1,071	7	1	7,137

It has been pointed out in paragraph 170 of Part I, that reduction in the length of fire lines is possible with a view to effect economies in the expenditure on fire protection. In the plains forests there are too many fire lines which are meant to protect the sal blocks marked under the former working plans. Some of these fire lines can be abandoned without endangering the safety of the forests. For example in Kurcholi-B and Panchabhuti reserves, there appears to be no necessity to fire trace the lines other than those around the worked coupes. The fire lines have now for the first time been marked in the working plan maps. The District Forest Officer will consider to what extent the present fire lines can be reduced.

382. *Control records.*—The control records to be maintained are (*a*) Record of Works and (*b*) Fire Maps.

383. *Record of works.*—The length of lines fire traced annually in each range, the expenditure incurred, the incidence of fires, etc., shall be entered in the Record of works. Each Range Officer shall maintain a Record of works relating to his range. A sample form is given in Appendix IX.

384. *Fire maps.*—Fire maps on 1 inch to 1 mile scale shall be maintained to show the area burnt in each year. Neat tracings of the reserves of each range will be made on cloth. The fires of each year shall be marked by distinctive, conventional signs and numbered by a numeral, year and the initial letter of the range. A reference list showing the number of the fire, the date of occurrence, cause of fire and area burnt shall be posted in the margin. One set of maps will be used for each five-year period commencing from the fire season of 1930. In the case of the regenerated coupes of the Plains Sal Timber Working Circle and of the Ravine and the Plains Sal Pole Working Circles, one inch fire maps are inadequate to represent clearly the area burnt in each year, and this is especially so if the burnt area is small. Such areas may need special silvicultural treatment and the effect of fire on the crop is also to be

watched. Therefore the burnt areas shall in these working circles also be separately marked on neat sketches on a scale of 4-inch to 1 mile and these sketches shall be pasted to the leaves of a blank book. A reference table on the margin will give the number of the fire, date of occurrence, cause of fire and area burnt.

Section 2.—Roads and Bridges.

385. *Road in the Tarasingi-Kukuluba valley.*—The need for a metalled road from Tilisingi through Tarasingi and Gayagonda to Rudapodaro has been emphasized in paragraph 101 of Part I. During the next ten years, the forests situated on either side of this valley, covering an area of 40,783 acres are prescribed for selection fellings. The yield at 8 cubic feet per acre is estimated to be 326,264 cubic feet and all the timber must find its way to the nearest market at Russellkonda with an average lead of about 25 miles. It is very doubtful whether the bulk of this timber can be sold with a fair margin of profit unless the lines of communication are improved and the felling areas are made accessible to the timber merchants of Russellkonda. If the metalled road is extended from Tilisingi to Rudapodaro for a distance of about 15 miles, it is expected that every cubic foot of timber will appreciate in value by not less than one anna and possibly by two annas. Taking the low figure of one anna per cubic foot, the increased revenue will be Rs. 20,390 in the next ten years. Apart from this the road project has considerable justification from the standpoint of general administration.

Along the shortest alignment the distance from Tilisingi to Tarasingi is 7 miles 2½ furlongs. It consists of three sections. The first section is a metalled road called Captain Irwin's road running from Tilisingi to the Chandragiri reserve boundary for a length of 1 mile 2 furlongs. The second section is an earthen road of 4 miles 5½ furlongs constructed in 1927–1930 at a cost of Rs. 2,248 excluding the cost of Kutranalo bridge. The third section of 1 mile 3 furlongs is an old earthen road to Tarasingi. The total length of the earthen road to Tarasingi via Kriamba is 6 miles ½ a furlong and it needs to be improved and metalled wherever necessary. Embankment and metalling over bad stretches would cost about Rs. 3,000. Orders are already in force to extend the earthen road from Tarasingi through Gayagonda to Rudapodaro for a distance of about 9 miles. The road is to be so constructed as to be fit for metalling ultimately. The cost of the earthen road including culverts and land acquisition is estimated to be Rs. 8,000. After the road is made up to Rudapodaro the question of metalling should be considered and also whether two branches should be taken, one to Gogodo for a distance of 3 miles 3 furlongs and the other to Bodogundribadi for a distance of 7 miles.

386. *Annual repairs.*—The total length of roads constructed up to 1929–1930 is 100 miles 3 furlongs 1 chain and their book value on 1st April 1930 is Rs. 57,322. All existing roads will be kept in good repair. The nature and extent of repairs necessary will be decided by the District Forest Officer. On the basis of the averages for the past three years from 1927–1928 to 1929–1930, the annual repairs to roads and bridges are estimated to cost Rs. 2,200. For details of the roads to be maintained, vide paragraph 174 of Part I.

Section 3.—Buildings, Wells and Forest Rain-gauges.

387. *New buildings.*—Ghumsur is now well provided with inspection bungalows and therefore no new ones are proposed. The thatched sheds cost a large sum of money to be kept in good repair and it is a matter for consideration whether the thatched rest-houses and subordinates' quarters should not gradually be replaced by tiled buildings. Foresters' quarters are necessary, one at Tilisingi in Kukuluba range and the other at Tarasingi in Bontha range. The cost of the two quarters is expected to be Rs. 2,200.

388. *Annual repairs.*—The book value of buildings on 1st April 1930 is Rs. 89,110 and of wells, Rs. 3,843. Based on recent averages the annual

repairs on buildings will cost about Rs. 5,560 and on wells Rs. 200. The Extra Assistant Conservator's quarters were burnt down in April 1930. Provision is made for special repairs costing Rs. 5,600. For details of the buildings and wells to be maintained, vide paragraphs 172 and 173 of Part I.

389. *Forest rain-gauges.*—Forest rain-gauges will be maintained at Mojjagoda, Tarasingi, Kurcholi, Rogoda and Ramnabadi. The monthly rainfall at each one of these stations should be read and recorded correctly on the first day of the month.

SECTION 4.—STORES, TOOLS AND PLANT.

390. *Annual expenditure.*—The book value of stores on 1st April 1930 is Rs. 14,329. Based on the averages during the past three years, there will be a yearly capital expenditure of Rs. 450; and ordinary expenditure of Rs. 250. Total yearly expenditure is Rs. 700.

SECTION 5.—MAINTENANCE OF BOUNDARIES.

391. *Revision of reserve notifications.*—The reserves were originally notified under section 16, prior to their survey by the Survey of India Party. The boundary descriptions should be revised so as to agree with the Survey of India maps and fresh notifications under section 16 should be issued, vide paragraph 36 of Part I.

392. *Notification of enclosure boundaries in Pondakhol reserve.*—The boundaries of the village enclosures situated inside Pondakhol reserve should be described with reference to the Survey of India map and notified under section 16. There are some village enclosures inhabited by Kondhs and marked on the Survey of India maps but these do not find place in the section 16 notification. Such villages need settlement, vide paragraph 38 of Part I.

393. *Upkeep of reserve boundaries.*—The beat subordinates will be made responsible for the maintenance of all the reserve boundaries in their charge.

SECTION 6.—SURVEY OF COUPES.

394. *Instructions for survey.*—In the course of the present revision it has been found necessary to re-survey a large number of coupes owing to their wrong locations on the Survey of India maps. The re-survey has brought to light considerable differences in area. In one instance the difference is as much as 31 acres. In most cases the Range Officers do not observe the ordinary rules which govern a prismatic compass survey. Often, the field books do not contain all the information necessary for the correct posting of the coupes on the Control Maps. The following instructions are therefore laid down for the guidance of all officers engaged in the survey of coupes :—

(1) The survey will be carried out with a prismatic compass and Gunter's chain measuring 66 feet.

(2) Prior to survey, the compass will be checked in order to test whether the difference between the forward and back bearings is 180 degrees. The error should not exceed one degree.

(3) The Gunter's chain will be checked with a correctly measuring tape, every day before the commencement of survey.

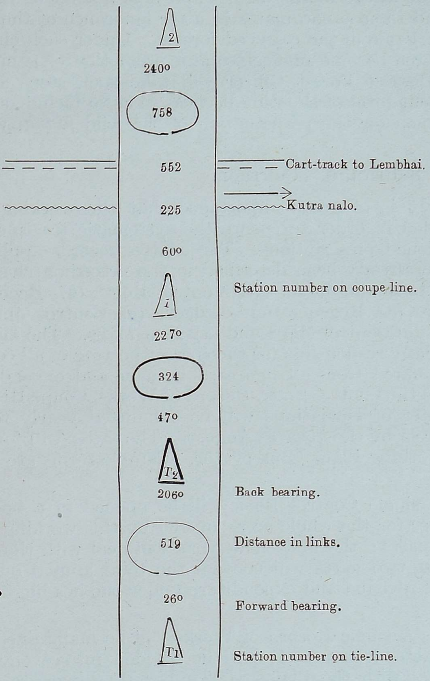
(4) The survey will invariably start from a known point which can correctly be identified on the Survey of India map. The known point may be a prominent corner on the reserve line or on the internal lines, junction of two streams or forest roads recognizable on the maps and other landmarks. The known point should be clearly and correctly described in the field-book.

(5) A tie-line will connect the known point with the coupe to be surveyed. The stations on the tie-line will be numbered T-1, T-2, T-3, etc.; and the stations along the coupe lines will be numbered 1, 2, 3, etc.

(6) Forward and back bearings will be read. At least three readings will be taken and two of them must agree.

(7) Topographical features like streams, cart-tracks, footpaths, reserve lines and cairns which follow or cut the line of survey will be indicated in the field-book. Their distances from the preceding stations will also be recorded.

(8) The results of survey will be recorded in a field-book in the manner illustrated below :—



NOTE.—Known point or T_1 starts from the prominent corner cairn on the reserve line, south-east of Borokhollia village.

SECTION 7.—SAMPLE PLOTS.

395. The permanent sample plots, referred to in paragraph 185 of Part I, which were laid out by the Forest Research Institute, Dehra Dun, in 1925 in the Plains Sal Pole Working Circle and the Plains Sal Timber Working Circle will be maintained and remeasured every five years by the Provincial Silviculturist. The data thus collected for yield of crops as opposed to single trees should be of great value when the working plan is revised in ten-year time and an attempt should then be made to allot these sal forests to the quality classes adopted in the rest of India.

SECTION 8.—FAUNA.

396. *Preservation of wild fauna.*—The poverty of game in the Ghumsur forests and the indiscriminate destruction which undoubtedly takes place have been dealt with in paragraphs 91 and 92 of Part I. In the matter of the preservation of game, attention is drawn to the special instructions issued by the Chief Conservator of Forests in his Proceedings Misc. No. 488, dated 25th November 1929. Every forest subordinate should be made alive to his duties in the prevention of illicit shooting and in the observance by the licence holders of the conditions under which the shooting licences are granted.

397. *Revision of the form of shooting licences.*—Shooting licences are being issued in a form which was standardized in B.P. F. No. 433, dated 21st September 1896, vide pages 97 and 98 of the Forest Manual, 1912 edition. Since then, various rules have been issued from time to time under section 21 (*h*) of the Madras Forest Act and such rules are not embodied in the shooting licences. Licence holders are not made aware of those rules and it is not uncommon to find even Range Officers and their subordinates in utter ignorance of the rules which govern the pursuit of game in the reserved forests. Under such circumstances even the rules in force become ineffective and protection of game can hardly be secured. The District Forest Officer will take such steps as are necessary to revise the present form of shooting licences so as to include all the relevant rules that are framed for the perpetuation of the wild *fauna*, within the reserved forests.

Section 9.—Control.

398. *Control records.*—It is of great importance that the working plan should be carefully controlled in order to ensure the systematic treatment of the forest under the sanctioned prescriptions. The control records applicable to each working circle have already been described in the preceding chapters. The following records will be maintained :—(*a*) Control Book, (*b*) Record of Works, (*c*) Coupe History, (*d*) Regeneration Ledger, (*e*) Control Journal, (*f*) Register of Deviations, (*g*) Control Maps and (*h*) Fire Maps. The District Forest Officer will be personally responsible for the correct posting of all control records. Pies will be eliminated from all figures of revenue and expenditure. Copies of the entries made in the Control Book, Record of Works, Coupe History, Control Journal and Register of Deviations will be submitted yearly to the Conservator of the First Circle by the 15th of August. The latter will forward them for scrutiny to the Working Plans Conservator. Sample forms are given in Appendix IX.

399. *Control Book.*—A single Control Book will be opened in a book of forms printed on stout paper for the whole area covered by this working plan. It will be divided into ten parts ; the first eight parts will deal with the eight working circles and the last two parts will contain the total annual outturn and the annual summary of revenue and expenditure under the headings given in Appendix IX.

400. *Record of Works.*—A single Record of Works will be maintained in a book of forms printed on stout paper. It will be divided into seven parts. The first five parts will deal with the Plains Sal Timber Working Circle, the Ravine, Plains Sal Pole, Selection and Fuel Working Circles. The last two parts will contain the fire protection operations and all other works in connexion with roads, buildings, etc., which cannot be allotted to a particular working circle.

401. *Annual summary of outturn.*—An annual summary of outturn by working circles will also be maintained in the form prescribed in Appendix IX.

402. *Coupe History.*—Coupe histories will be maintained for the Plains Sal Timber Working Circle and the Ravine Working Circle in the manner prescribed under their working plans.

403. *Regeneration Ledger.*—The maintenance of the Regeneration Ledger is prescribed for the Plains Sal Timber Working Circle and the Ravine Working Circle.

404. *Control Journal.*—A Control Journal as prescribed in the Madras Forest Department and Account Code, first edition 1927, will be maintained for the whole area covered by this working plan. In it will be recorded all matters of importance or general interest which are not obtainable from the prescribed forms but which are useful for the future revision of the working plan. The following main headings will be opened and a sufficient number of pages will be allotted to each heading :—(1) natural reproduction ; (2) bamboo flowering ; (3) silvicultural notes on important species ; (4) annual rainfall at the rain-gauge stations ; (5) injuries to the crop ; (6) shooting licences and the quantity and

kind of game shot inside the reserved forest ; (7) prices of timber obtained by species ; (8) details of actual exploitation with costs ; (9) results of artificial regeneration ; (10) sample plots and experimental plots ; (11) labour supply ; (12) areas reserved and disreserved ; (13) concessions granted to Kondhs ; (14) statistics of growth and yield ; (15) general history of the forest in running narrative form. Additional headings may be opened by the District Forest Officer as occasion arises.

405. *Register of deviations.*—All deviations from the prescriptions of the working plan should be sanctioned by proper authority. A Register of deviations will be maintained and it will be divided into nine parts. The first eight parts will be allotted for each one of the working circles, and the last part will deal with miscellaneous regulations. In it will be recorded briefly the nature of the deviation, reasons for deviation and the number and date of the order conveying sanction.

406. *Control Maps.*—A complete set of unmounted working plan maps consisting of 48 sheets (43 Survey of India sheets plus five manuscript sheets) on 4″ to one mile scale will be maintained as the Control Maps for all working circles. The following colours have been used in the preparation of the new maps :—water-proof liquid drawing inks of emerald green yellow, carmine tint, cobalt blue, burnt sienna, violet and orange ; burnt umber cake for the border of the Plains Sal Timber coupes ; and scarlet ink mixed with carmine cake for fire lines. The same colours will be employed in connexion with further map work.

407. *Fire maps.*—Fire maps on 1″ to one mile scale will be maintained as described in paragraph 384 of Part II. In the case of the regenerated coupes of the Plains Sal Timber Working Circle and of the Ravine and the Plains Sal Pole Working Circles, sketches on the scale of 4″ to one mile will also be maintained to show the area burnt in each year.

CHAPTER XI.—ESTABLISHMENT AND LABOUR.

SECTION 1.—ESTABLISHMENT.

408. *Executive staff.*—The possibility of reducing the present strength of the executive staff has been dealt with in paragraph 121 of Part I. Necessary steps should be taken at once to abolish the post of the Pondakhol Range Officer and his office establishment. The Surada Range Officer should hold additional charge of Pondakhol range and be given extra allowance limited to 30 per cent of his pay as is allowed to the Range Officer, Mojjagoda, for the charge of Chokkapad reserve in the Agency. In such an event it will be necessary to post a forester to Gazilbadi the headquarters of the Pondakhol range. The strength of foresters should be reduced from 20 to 15 and they may be distributed among the ranges as follows :—Russellkonda 2, Mojjagoda 4, Kukuluba 2, Bontha 2, Buguda 2, Surada 2 and Pondakhol 1. There are at present 71 beats, each beat being manned by a forest guard and a watcher. The District Forest Officer has taken up the question of reducing the number of beats and is considering the matter range by range. It is certain that the number can be reduced by 7. The actual distribution of the staff will be left largely to the discretion of the District Forest Officer.

409. *Cost of establishment.*—The District Forest Officer, Ganjam, and his establishment perform a number of duties besides the management of the Ghumsur Forests. The District Forest Officer holds charge of the Berhampur range which has its own working plan and of the Balliguda Agency. The custom in the District Forest Office is to distribute the pay and other headquarters expenditure of the District Forest Officer and of his office establishment among the different administrative units in proportion to the expenditure incurred in those units. Taking 1929–30 as an average year, the proportion to be charged to the Ghumsur Forests works out to 82 per cent or about four-fifths of the cost.

The remaining one-fifth is a charge against the Berhampur range and Balliguda Agency. The District Forest Officer, his office and executive establishment spend quite an appreciable amount of time in dealing with free grants and the applications for and sales of unreserved 'bunjar' lands containing tree growth, from which an annual revenue of about Rs. 23,500 is drawn. This revenue will not be shown in favour of the Ghumsur forests. Further the District Forest Officer attends to the correspondence of the Collector on all forest matters and has also to correspond with the Zamindars whose forests are managed under section 26 of the Madras Forest Act. It would be approximately correct to charge one-fifth of the pay of the entire staff to these general matters which are unconnected with the working of the Ghumsur forests. The cost of establishment charged to the Ghumsur forests will therefore be (*a*) three-fifths of the pay of the District Forest Officer and his office establishment and (*b*) four-fifths of the pay of the Ghumsur range establishment and of the extra Assistant Conservator at Russellkonda. In the future calculations it will be convenient to adopt these proportions uniformly for every year. On the assumption that the retrenchments proposed in the preceding paragraph will be carried out, the annual pay of the establishment to be charged to the Ghumsur forests is shown below. For this purpose the following sums calculated on a conventional formula are used for the average pay of the various classes of officers :—

	Average monthly pay.		Average monthly pay.
	RS.		RS.
1. Imperial Officer	997	4. Forester	37
2. Provincial Officer	547	5. Forest guard	17
3. Ranger	138		

In regard to the clerical and menial establishment, the pay as it stood on April 1930 is adopted.

	Annual pay.
	RS.
(*a*) *District Forest office establishment.*—	
One District Forest Officer at Rs. 997 per month	11,964
Ten clerks at Rs. 523 per month	6,276
Four peons at Rs. 54 per month	648
Total	18,888
(*b*) *Range establishment.*—	
One extra Assistant Conservator at Rs. 547 per month	6,564
One extra Assistant Conservator's clerk at Rs. 35 per month	420
One extra Assistant Conservator's peon at Rs. 12 per month	144
Six Range officers at Rs. 828 per month	9,936
Six Range clerks at Rs. 272 per month	3,264
Six Range peons at Rs. 80 per month	960
Fifteen Foresters at Rs. 555 per month	6,660
Sixty-four Forest Guards at Rs. 1,088 per month	13,056
Sixty-five Forest watchers at Rs. 552½ per month	6,630
Eighteen bungalow watchers including three Circuit house establishment at Rs. 118 per month	1,416
Total	49,050 or 49,000

To be charged to the Ghumsur forests.

Three-fifths of the pay of (*a*) District Forest office establishment	11,333
Four-fifths of the pay of (*b*) Range establishment	39,200
Total	50,533

SECTION 2.—LABOUR.

410. *Labour.*—The present labour supply is sufficient for the works proposed in this working plan and there is no necessity to import outside labour. Khond labour wherever available is more dependable than Oriya labour and it is of the utmost importance that the concessions enjoyed by the Khonds be administered in such a manner as to secure their goodwill and co-operation in all forest works.

CHAPTER XII.—FINANCIAL FORECAST AND COST OF THE WORKING PLAN.

411. *Financial forecast.*—The estimate of revenue and expenditure is based on the rates of recent years, due allowance having been made for other considerations affecting the yield and the working of the forests as well as the general trend of the market. Besides the Ghumsur forests, the district includes two other administrative units, namely, the Berhampur range and the Balliguda Agency. Revenue and expenditure of these units have been left out of account. From the unreserves of Ghumsur an annual revenue of Rs. 23,500 is drawn and this will not be shown in favour of the Ghumsur forests. For the time spent in dealing with unreserves and other general matters, a certain deduction has been made from the expenditure on establishment maintained for the Ghumsur forests. The pay of the District Forest Officer and his establishment to be charged to the Ghumsur forests has been calculated separately and the details are given in paragraph 408. The net result of working would be an annual surplus of about Rs. 3,050 after allowing an interest of Rs. 510 on the capital cost of demarcation, buildings and wells, roads and bridges, stores, tools and plant. In dealing with past management, attention has already been drawn to the over-exploitation of the forests carried out during the past decade, for the Russellkonda Saw Mill. Such over-exploitation has taken place in all the timber producing working circles. As a result, the yield and therefore the revenue in the future will be considerably reduced. The present estimate of the total revenue during the currency of this working plan from the Plains Sal Timber Working Circle, the Ravine Working Circle and the Selection Working Circle is Rs. 2,90,000 or an annual revenue of Rs. 29,000 only.

A factor which is vitally connected with the working of the Ghumsur forests is the project of a railway line to Russellkonda. The central market of Russellkonda is situated at a distance of 52 miles from the nearest railway station at Berhampur. Under present conditions, every cubic foot of timber has to bear a transport charge of six annas from Russellkonda to Berhampur in order to be railed to the other markets on the railway. Similarly every class of produce suffers a handicap in reaching the consumer at an economic price. If a railway is brought to Russellkonda, it is certain that the prices of timber, poles, fuel and bamboos will be doubled and even at the present rate of working, an additional revenue of at least Rs. 7,00,000 can be expected in the next ten years. The possibilities of expanding other sources of revenue are considerable, e.g., from the miscellaneous timber which cannot now be marketed at a profit. In 1903, Mr. S. Cox spoke of the construction of a railway line as imminent. Mr. Minchin's Working Plan of 1919 expressed the opinion that "the finances of the district are likely to improve markedly, only when a railway is brought to Russellkonda." In 1920, a narrow gauge line was estimated to cost about 40 lakhs of rupees. The Bengal-Nagpur Railway Company found that a broad gauge line would not pay, but that a narrow gauge line would be a five per cent proposition. In November 1925, the Honourable the Home Member and the Finance Member of Government visited Russellkonda when the saw mill was working and then Mr. A. F. Minchin, Conservator of Forests, First Circle, discussed with them the financial prospects of the Ghumsur forests in the event of the construction of a railway to Russellkonda. Subsequently Mr. Minchin wrote a detailed note for the information of Government so that the question of the railway may be taken up in earnest—vide his letter No. 522/26, dated 29th March 1926.

In 1927, the District Engineer, Miscellaneous Surveys, Bengal-Nagpur Railway, expressed the view that the construction of the line was unlikely to be financially justified unless the Forest Department could see its way to supplying the 103,700 sleepers required, at a price just above cost. The Chief Conservator of Forests, Mr. Richmond, addressed Government on the matter, and pointed out that, assuming the price fixed was Rs. 6 per broad gauge sleeper, this would involve an immediate financial sacrifice on our part of Rs. 2,60,000. There appeared to be some doubt, also, as to whether the number of sleepers required could be supplied at all. After further enquiry and correspondence, the Chief

Conservator of Forests advised Government that rather than undertake to supply sleepers at a reduced price it would be better to offer to guarantee the railway against their profit falling below 5 per cent on their capital outlay, to an extent of Rs. 50,000 per annum, the cost being shared between the Forest Department and General Administration, and the sums so paid being returnable when the railway line became remunerative. Government were however not satisfied with the figures put before them and called for closer estimates and a further report. It was impossible to make a more exact forecast of results than that contained in Mr. Minchin's note of 1926, unless a thorough re-examination of the forest were undertaken involving enumerations over considerable areas. In view of the fact that this working plan was, by that time, already in course of preparation, further action was postponed until it should be completed.

The general conclusions arrived at now are that the construction of the proposed railway would be greatly to the advantage of the forest department, as profits would rise owing to the lower cost of marketing the produce and also owing to the possibility of reaching more distant markets than those touched at present. Owing to the present state of the finances of India, however, it is not anticipated that anything can be done immediately, but the matter should, it is considered, be reopened as soon as the monetary position improves, and re-examined in the light of the fresh knowledge gained during the preparation of this working plan.

In the financial forecast for the next ten years it is proposed to distinguish the capital outlay from the ordinary expenditure to be incurred during the period of this working plan and charge against annual revenue the interest on the capital value of demarcation, buildings and wells, roads and bridges, stores, tools and plant. For this purpose it will be presumed that approximately 50 per cent of the total cost will be incurred in the first half of the period and the other 50 per cent in the second half. Interest at 5 per cent per annum will be calculated on 50 per cent of the total capital outlay and charged uniformly against each year's revenue. The cost of the existing buildings and wells, roads and bridges, stores, tools and plant was paid for out of the revenue of the previous years and is therefore looked upon as having been completely written off. No interest is charged on their account against the present working plan.

Interest per annum to be charged against revenue.

The following are the items of expenditure on which interest will be calculated :—

	Capital expenditure.		Capital expenditure.
	RS.		RS.
Demarcation	2,500	Roads and bridges	11,000
Buildings	2,200	Stores, tools and plant	4,500
Wells	..		
		Total ..	20,200

Interest at 5 per cent per annum on half the capital outlay on demarcation, buildings and wells, roads and bridges, stores, tools and plant, i.e., on Rs. 10,100 Total .. Rs. 505

Estimate of Revenue, 1930-31 *to* 1939-40.

	RS.
Plains Sal Timber Working Circle—	
Clear-fellings—	
Felling series I—1,407 acres at Rs. 75 per acre	1,05,500
Felling series II—452 acres at Rs. 100 per acre	45,200
Ravine Working Circle—	
Clear-Fellings—	
Felling series I—563 acres at Rs. 20 per acre	11,300
Felling series II—240 acres at Rs. 20 per acre	4,800
Plains Sal Pole Working Circle—	
Coppice fellings—	
23 Felling series—8,098 acres at Rs. 40 per acre	3,23,900
Thinnings from Plains Sal Timber, Ravine and Plains Sal Pole Working Circles at Rs. 800 per year	8,000
Selection Working Circle—	
281,250 cubic feet of sal at Re. 0-6-0 per cubic foot	1,05,500
94,250 cubic feet of other species at Re. 0-3-0 per cubic foot	17,700
375,500	

Estimate of Revenue, 1930–31 *to* 1939–40—cont.

	RS.
Fuel Working Circle—	
Coppice fellings—	
15 Felling series—5,250 acres at Rs. 8 per acre	42,000
Bamboo Working Circle—	
23 Felling series—189,011 acres at Re. 0–5–6 per acre	65,000
Minor Produce Working Circle—	
Lease of Cassia Fistula (rela) bark at Rs. 700 per year	7,000
Sale of other produce on permits at Rs. 550 per year	5,500
Grazing Working Circle—	
Grazing fees from all ranges at Rs. 9,500 per year	95,000
Rents on buildings at Rs. 1,700 per year	17,000
Other sources (confiscated produce, fines and forfeitures, compounding fees, fire protection contribution, permits sold to contractors, etc.) at Rs. 8,380 per year ..	83,800
Total, Revenue ..	9,37,200
Or an average annual revenue of ..	93,720

Estimate of Expenditure, 1930–31 *to* 1939–40.

Plains Sal Timber Working Circle—		
Felling Series I and II—		
Regeneration 1,859 acres at Rs. 4 per acre		7,400
Cleaning, climber-cutting and thinning		17,200
Subsidiary tending in the natural forest		1,400
Ravine Working Circle—		
Felling Series I and II—		
Regeneration 653 acres at Rs. 4 per acre		2,600
Artificial regeneration 150 acres at Rs. 23–8–0 per acre		3,500
Weeding, cleaning, climber-cutting and thinning		6,000
Subsidiary tending in the natural forest		900
Plains Sal Pole Working Circle—		
23 Felling Series—		
Cleaning and thinning		16,000
Selection Working Circle—		
Extraction of 375,500 cubic feet at Re. 0–1–0 per cubic foot		23,500
General—		
Demarcation (ordinary) at Rs. 250 per year		2,500
Fire protection at Rs. 6,500 per year		65,000
Buildings (ordinary) at Rs. 6,120 per year		61,200
Wells (ordinary) at Rs. 200 per year		2,000
Roads and bridges (ordinary) at Rs. 2,000 per year		20,000
Stores, tools and plant (ordinary) at Rs. 250 per year		2,500
Pay of establishment at Rs. 50,530 per year		5,05,300
Allowances—	RS.	
Travelling allowance—Non-voted ..	3,000	
Travelling allowance—Voted ..	7,340	
Fixed conveyance allowance ..	960	
Fixed travelling allowance ..	2,100	
	13,400 per year	1,34,000
Commission to Permit Issuing gumasthas at Rs. 300 per year		3,000
Contingencies at Rs. 3,500 per year		35,000
Miscellaneous (Rent, taxes, supplies and services, etc.)		12,600
Total Expenditure ..		9,21,600
Or an average annual expenditure of		92,160
Add interest on the capital cost of demarcation, buildings and wells, roads and bridges, stores, tools and plant		505
Total, annual expenditure ..		92,665
Annual surplus Revenue ..		1,055

412. *Cost of the Ghumsur Working Plan.*—The working plan division was formed on the 23rd September 1927 with one clerk as the staff of the Working Plans Officer. At that time, work in Ganjam had become very much dislocated on account of the working of the Russellkonda Saw Mill and the District Forest Office records were in great confusion. The only control record that was being maintained was a " Control journal " and even the posting of this was then two years in arrears. The Working Plans Officer was therefore ordered to collect the control figures of all the previous years from each one of the seven range offices and post them afresh in appropriate forms for his own use. This work extended until the end of January 1928. Subsequently the proposals for the revision of the working plan were outlined and the revision work

commenced from February 1928. The working plan, two sets of working plan maps consisting of 48 sheets in each set and the key map were all completed on the 28th of February 1931. The expenditure incurred until the end of January 1928 cannot be a proper charge against the Ghumsur Working Plan and will therefore be excluded from the cost of preparation of the plan. The details of expenditure are given below :—

	RS.
Pay of the Working Plans Officer	28,235
Pay of establishment—Permanent	13,885
Do. Temporary	499
Travelling allowance—Non-voted	7,982
Do. Voted	6,075
Fixed travelling allowance	32
Fixed conveyance allowance	615
Contingencies	1,517
Supplies and services	41
Stores, tools and plant	18
Working Plans	1,389
Total ..	60,288
Deduct—Expenditure incurred in posting the Control Forms	3,612
Balance : Cost of the Ghumsur Working Plan	56,676

M. KESAVANUNNI NAYAR,
Working Plans Officer.

C. C. WILSON,
Conservator of Forests, III (Working Plans) Circle.

SUMMARY OF PRESCRIPTIONS.

Basis of Proposals.

PARAGRAPH

1. *General objects of management.*—The main objects of management are (1) to provide for the interests and needs of the local population (2) to improve the forest by the silvicultural treatment of the present crop and by protection against injuries, (3) to maintain and increase the productivity of the soil, (4) to aim at a sustained yield and to obtain the highest possible net return per acre per annum in perpetuity, (5) to prevent erosion and regulate the water-supply and (6) to preserve the wild fauna of the forest 189
2. *Methods of treatment to be adopted.*—The irregular natural sal forest of qualities I and II occurring in the plains and the ravine sal forest will be converted into regular even-aged crops by clear-felling followed by natural regeneration from advance growth. In the ravine sal forest, teak and *Gmelina arborea* to be introduced artificially on a limited scale. The third quality plains sal, the minor hill forest, the scrub jungle and the better parts of broken grounds will be worked under the simple coppice system. The mixed hill forests and other suitable areas will be worked under the selection system. The new crops derived from clear-fellings of the first and second quality plains sal as well as the ravine sal and the crops resulting from the coppice fellings of the third quality plains sal will be specially tended according to their silvicultural needs. Grazing to be regulated and every effort made to exclude fires. Forest offences to be controlled by a system of organized patrol 190
3. *Working circles, their area and distribution, reasons for their constitution.*—Eight working circles are accordingly prescribed, namely, (1) Plains Sal Timber Working Circle, (2) Ravine Working Circle, (3) Plains Sal Pole Working Circle, (4) Selection Working Circle, (5) Fuel Working Circle, (6) Bamboo Working Circle, (7) Minor Produce Working Circle and (8) Grazing Working Circle. Area, distribution and reasons for their constitution have been given 191
4. *Period of Working plan and necessity for intermediate revision.*—The working plan covers a period of ten years from 1st April 1930 to 31st March 1940. Revision to be taken in hand two years in advance of the expiry of the present plan 192

PLAINS SAL TIMBER WORKING CIRCLE.

A.—Main Prescriptions.

	Paragraph
1. *Felling series.*—Two felling series; Felling Series I consists of the first and second quality plains sal forests of Russellkonda, Mojjagoda, Kukuluba and Bontha ranges; Felling Series II comprises the first and second quality plains sal forests of Buguda, Surada and Pondakhol ranges	198
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4. *Rotation.*—Sixty years	203
5. *Regulation of the yield.*—Yield to be regulated by area; the annual coupe is obtained by dividing the total area by rotation	205
6. *Laying out the annual coupe.*—Coupe to be selected under the personal supervision of the District Forest Officer. Adjoining third quality sal to be avoided	206
7. *Survey of the coupe.*—Coupe to be surveyed by a Ranger before the end of December. Area of individual parts to be rounded off to the nearest acre ..	207
8. *Clear-felling.*—Coupes to be sold in January. Before fellings commence in February, the Range Officer shall hammer mark the trees along the outer edge of the coupe line. Everything to be cut down. Fellings and removals to be completed by the end of the following January	208
9. *Burning the felling debris.*—Burning to commence on the 1st February. Run a ground fire. Then the unburnt logs to be piled up at selected places and burnt to ash	209
10. *Cutting back sal advance growth.*—All sal advance growth to be cut back nearly flush with the ground at a height not exceeding 3 inches. Cutting back shall immediately follow the burning and to be completed by the end of February	210
11. *First-year cleaning.*—A cleaning to be carried out in October-November when the crop is about 8 months old—Rules prescribed. Clumps of sal shoots at each root stock to be reduced to one good stem	211
12. *Second-year cleaning.*—A second-year cleaning similar to the first, to be carried out in October-November when the crop is about 1 year and 8 months old ..	212
13. *Fourth-year climber cutting.*—Climbers to be cut in October-November when the crop is about 3 years and 8 months old. Sal 'wolves', non-sal species overtopping sal and bamboo regrowth to be cut. Close supervision required ..	213
14. *Eighth-year thinning.*—A thinning to be executed in December-January when the crop is about 7 years and 9 months old. Rules prescribed. Crop should not be opened very heavily. Sal of switch origin to be favoured against sal of coppice origin. To be supervised by an officer not below the rank of a Forester. District Forest Officer to teach the subordinates the practice of thinnings	214
15. *Thirteenth-year thinning.*—A second thinning to be executed in December-January when the crop is 12 years and 9 months old. Rules prescribed. Sal crowns to be given adequate growing space. Sal of switch origin to be favoured against sal of coppice origin. Marking to be done by Range Officer and thinning to be supervised by an officer not below the rank of a Forester. District Forest Officer to mark as much area as he can in any case not less than 10 per cent	215
16. *Further thinning.*—Further thinning to be considered at the next revision of the working plan	216
17. *Special tending of crops browsed by deer and bison.*—Browsing to be watched in one and two-year old crops situated in remote localities, e.g., in Kriamba reserve. Range Officer to report the browsing incidence to the District Forest Officer. Broken saplings to be cut back early in July. Crop to grow untouched until the age of about five years. A climber-cutting and a light cleaning to be done in the fifth year	217
18. *Subsidiary tending—Climber-cutting in the natural forest.*—In the first and second quality natural forest, one climber cutting to be done during the period of the plan. Climbers to be cut in the rainy months of July-August	218

B.—Miscellaneous Prescriptions.

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PARAGRAPH

20. *Fire protection.*—Clear-felled and regenerated coupes to be protected by 15-foot fire lines to be cleared and fire-traced every year. The unworked forests to be protected by fire-tracing 15 feet wide block lines and rights of way .. 225
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22. *Quarrying.*—The whole working circle to be closed to quarrying 227
23. *Charcoal burning.*—Charcoal burning permitted inside the coupes under working. 228
24. *Inspection paths.*—Inspection paths 6 feet wide to be cut inside the worked coupes dividing them into parts of about 20 acres each 229
25. *Experimental plots.*—The seven experimental plots in connexion with white ant and fungus attack on sal to be treated in the same manner as the rest of the coupe in which they are opened 230
26. *Control.*—Control Book, Record of works, Coupe History, Regeneration Ledger, Control Maps and Fire Maps to be maintained .. .. 231 to 237

RAVINE WORKING CIRCLE.

A.—Main Prescriptions.

1. *Felling series.*—Two felling series. Felling Series I comprising the ravine sal forests of Russellkonda, Mojjagoda, Kukuluba and Bontha ranges. Felling Series II consists of the ravine sal forests of Buguda, Surada and Pondakhol ranges 242
2. *Choice of species.*—Sal to be chosen for regeneration. Where the natural regeneration of sal is deficient, other species prescribed. In Felling Series I, 10 acres of teak and 5 acres of *Gmelina arborea* to be raised artificially every year 245
3. *Silvicultural system.*—High forest clear-felling with natural regeneration from sal advance growth. Teak and *Gmelina arborea* to be raised on a limited scale by artificial regeneration 246
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    (*a*) *Nursery.*—A nursery of about ¼ acre to be laid out for producing 17,000 teak stumps. The site to be near water and not far from the planting area.
    (*b*) *Collection of seed.*—The best teak seed to be used. If the local supply is insufficient or unsatisfactory, the District Forest Officer to obtain seed from elsewhere in consultation with the Forest Research Officer. Trees of *Gmelina arborea* to be marked beforehand. The ripe fruit to be collected from the ground, the pulp removed and the stones well dried by the end of May .. ..

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(c) *Preparation of the ground.*—Espacement 6 feet by 6 feet. Planting area to be lined and staked in April. Bamboo stakes to be used. In May the soil to be loosened at each stake to a depth of one foot. Grass and weed growth to be cut around each stake .. ..

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17. *Thirteenth-year thinning.*—A second thinning in December–January. Rules similar to those described under the Plains Sal Timber Circle, paragraph 215. Marking to be done by the Range Officer and thinning to be supervised by an officer not below the rank of a Forester. The District Forest Officer to decide on personal inspection whether the teak and *Gmelina* shall also be thinned 261

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24. *Charcoal burning.*—Charcoal burning permitted inside the coupes under working. 274

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5. *Regulation of the yield.*—Yield to be regulated by area. The annual coupe is obtained by dividing the area by the rotation 296

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8. *Coppice felling.*—Sales to be held in May. Voidah from 1st July to 30th June. Before fellings commence in July, Range Officer should hammer-mark the trees along the outer edge of the coupe line. Everything to be cut down. Felling rules prescribed 299

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APPENDIX I.

STATEMENT OF RAINFALL IN INCHES.

(1) *Russellkonda rain-gauge from* 1870 *to* 1929.

(Maintained by the Revenue Department.)

Year.	Months.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
1870	2·15	..	1·88	0·65	1·20	5·25	7·65	11·03	11·56	8·29	3·35	..	53·01
1871	..	0·55	0·25	3·90	1·55	8·82	7·30	6·15	7·30	1·00	..	..	36·82
1872	..	0·90	0·60	2·40	6·40	12·60	18·82	15·25	15·58	9·43	1·35	4·30	87·63
1873	0·50	..	2·30	0·58	3·37	1·29	7·90	9·82	4·95	2·87	0·34	0·47	34·39
1874	1·60	0·55	2·74	1·01	5·84	11·83	13·27	9·52	5·00	8·35	3·40	..	63·11
1875	0·62	..	0·10	0·97	3·82	4·22	14·55	9·82	16·82	5·72	..	..	56·64
1876	..	..	0·80	0·60	3·52	4·73	7·97	5·37	10·40	7·49	..	..	40·88
1877	2·02	3·30	2·37	2·90	8·25	7·60	4·58	8·67	4·60	5·66	..	0·15	50·10
1878	..	0·25	0·92	0·53	6·06	2·65	7·63	19·14	8·59	6·79	5·87	1·51	59·94
1879	..	0·35	..	0·06	9·08	2·51	9·19	11·68	7·16	3·41	4·81	0·40	48·65
Total ..	6·89	5·90	11·96	13·60	49·09	61·50	98·86	106·45	91·96	59·01	19·12	6·83	531·17
Average ..	0·69	0·59	1·20	1·36	4·91	6·15	9·89	10·65	9·20	5·90	1·91	0·68	53.12
1880	0·12	2·29	0·08	2·13	4·24	10·02	14·06	8·49	7·70	5·51	0·97	..	55·61
1881	..	..	0·43	0·72	1·67	10·47	8·21	8·34	9·91	4·75	0·15	0·05	44·70
1882	0·07	0·62	..	2·36	2·55	6·75	10·90	10·17	10·82	2·89	2·13	0·15	49·41
1883	0·03	0·40	1·00	1·96	1·44	15·41	11·55	6·77	13·14	6·28	5·94	0·91	64·83
1884	..	2·40	0·30	0·92	2·17	5·39	7·74	4·23	15·70	2·65	0·14	0·76	42·40
1885	..	2·78	0·41	1·89	2·07	4·60	5·61	7·45	6·20	2·38	2·87	3·34	39·60
1886	0·54	0·28	2·11	0·02	3·83	7·18	10·15	8·64	11·73	9·85	5·08	2·82	62·23
1887	..	..	0·92	0·78	4·11	5·55	6·64	6·83	8·12	3·05	1·35	..	37·35
1888	0·80	0·65	..	0·29	0·83	5·21	5·07	10·02	6·30	0·03	2·14	..	31·34
1889	..	..	0·03	0·08	1·60	5·53	12·02	7·39	5·74	10·86	10·46	0·38	54·09
Total ..	1·56	9·42	5·28	11·15	24·51	76·11	91·95	78·33	95·36	48·25	31·23	8·41	481·56
Average ..	0·16	0·94	0·53	1·12	2·457	·61	9·20	7·83	9·54	4·83	3·12	0·84	48·16

(1) *Russellkonda rain-gauge*—cont.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
	Months.												
1890	..	..	2·52	0·66	5·16	6·10	8·09	8·27	11·51	6·03	0·40	1·68	50·42
1891	0·13	0·61	4·85	0·50	10·02	2·40	5·55	10·76	12·90	0·29	1·13	..	49·14
1892	..	..	..	1·01	2·01	9·71	11·47	7·98	13·21	5·65	0·23	..	51·27
1893	2·34	2·68	2·42	1·69	2·89	6·36	12·12	8·17	11·31	3·64	0·40	..	54·02
1894	0·03	0·96	0·27	2·44	0·69	6·78	14·02	4·88	5·35	4·16	3·30	..	42·88
1895	..	0·58	0·37	4·09	3·43	18·94	13·78	10·79	6·61	4·04	0·23	..	62·86
1896	..	..	2·70	0·80	2·97	7·14	7·73	13·01	4·83	..	0·10	..	39·28
1897	0·04	3·20	1·42	0·90	1·22	4·54	6·71	10·86	12·79	6·48	1·81	..	49·97
1898	..	0·48	0·08	3·05	2·65	6·53	11·10	6·43	7·83	4·18	..	0·61	42·94
1899	..	..	..	2·98	4·14	4·02	11·06	8·31	3·29	7·02	..	0·01	40·83
Total ..	2·54	8·51	14·63	18·12	35·18	72·52	101·63	89·46	89·63	41·49	7·60	2·30	483·61
Average ..	0·25	0·85	1·46	1·81	3·52	7·25	10·16	8·95	8·96	4·15	0·76	0·23	48·36
1900	..	0·17	2·00	2·87	3·23	8·43	9·06	9·45	11·23	12·68	..	..	59·12
1901	1·55	2·12	1·09	1·98	2·81	5·60	9·37	8·27	4·73	3·53	2·90	..	43·95
1902	0·24	..	0·91	6·67	2·68	5·27	11·64	13·28	6·97	1·85	0·65	0·57	50·73
1903	0·81	0·38	0·22	0·91	1·60	3·71	13·49	14·23	12·13	9·71	3·16	2·99	63·34
1904	..	0·47	0·98	0·15	1·85	7·89	6·95	11·21	8·14	6·72	..	0·10	44·46
1905	0·46	0·30	4·93	3·68	3·31	4·31	10·43	11·82	5·93	3·91	0·18	..	49·26
1906	..	0·74	4·38	0·24	3·09	6·85	8·12	11·19	11·32	5·35	0·28	1·40	52·96
1907	..	0·06	3·35	5·73	2·57	7·97	12·47	9·49	7·07	1·04	1·70	1·53	52·98
1908	3·48	..	0·31	0·95	2·88	7·31	9·23	12·77	8·90	4·13	..	..	49·96
1909	0·05	1·48	1·02	6·35	1·92	17·80	7·79	11·36	6·22	1·50	..	4·03	59·52
Total ..	6·59	5·72	19·19	29·53	25·94	75·14	98·55	113·07	82·64	50·42	8·87	10·62	526·28
Average ..	0·66	0·57	1·92	2·95	2·59	7·51	9·86	11·31	8·26	5·04	0·89	1·06	52·63
1910	0·98	..	0·03	1·68	2·28	8·93	12·45	8·03	13·03	13·12	0·54	..	61·07
1911	..	..	0·43	..	..	..	2·48	7·39	16·41	3·27	0·72	..	30·70
1912	..	2·62	0·10	2·47	2·58	7·17	11·01	11·76	10·94	3·03	4·10	..	55·78
1913	..	1·83	1·08	3·25	5·32	18·81	13·82	13·64	8·67	8·80	3·01	0·38	78·61
1914	..	0·90	0·26	3·15	7·42	5·58	7·15	11·23	16·61	0·03	..	0·21	52·54
1915	0·42	1·53	1·00	0·11	4·72	7·29	6·55	9·51	10·68	10·16	6·94	..	58·91
1916	..	..	..	1·96	0·20	13·89	15·00	11·79	5·80	10·91	3·04	..	62·59
1917	..	4·92	2·03	2·16	4·85	8·53	13·44	10·02	12·28	10·52	0·55	0·03	69·33
1918	0·35	..	1·20	0·96	2·71	6·49	6·43	7·58	2·59	0·04	0·25	0·04	28·64
1919	3·98	3·42	1·44	1·61	5·95	14·54	14·94	11·66	10·77	2·80	4·96	0·07	76·14
Total ..	5·73	15·22	7·57	17·35	36·03	91·23	103·27	102·61	107·78	62·68	24·11	0·73	574·31
Average ..	0·57	1·52	0·76	1·74	3·60	9·12	10·33	10·26	10·78	6·27	2·40	0·07	57·43
1920	0·18	1·29	2·02	0·73	2·43	10·80	11·11	5·40	4·32	0·91	0·30	..	39·49
1921	4·62	0·32	0·19	0·65	0·40	5·89	13·05	4·99	11·52	1·40	..	..	43·03
1922	0·54	..	0·21	0·16	2·87	9·28	8·26	11·87	13·82	3·75	1·03	..	51·79
1923	..	1·57	0·08	1·75	3·07	6·18	7·04	4·45	8·55	8·68	5·40	..	46·77
1924	1·77	0·11	..	2·33	6·40	2·97	5·52	10·43	12·44	6·55	11·37	..	59·89
1925	..	..	..	2·71	7·55	11·98	6·19	19·22	6·95	9·66	..	0·12	64·38
1926	1·70	0·36	9·82	1·79	1·31	3·76	7·73	16·93	12·83	2·58	..	..	58·81
1927	..	1·29	0·18	1·00	1·68	8·72	14·92	12·21	16·17	2·96	2·65	..	61·78
1928	..	..	0·04	3·98	5·98	11·13	12·10	7·69	12·54	8·94	..	..	62·40
1929	0·59	0·42	..	0·51	1·58	4·79	5·26	9·34	8·96	5·55	..	0·02	37·02
Total ..	9·40	5·36	12·54	15·61	33·27	75·50	91·18	102·53	108·10	50·98	20·75	0·14	525·36
Average ..	0·94	0·54	1'25	1·56	3·33	7·55	9·12	10·25	10·80	5·10	2·08	0·01	52·54

(2) *Surada rain-gauge from* 1870 *to* 1929.

(Maintained by the Revenue Department).

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
1870	1·2	..	3·50	1·40	1·10	5·10	8·90	8·20	9·44	10·98	3·28	..	53·15
1871	0·31	0·94	1·40	2·73	4·47	5·98	10·43	5·73	9·72	0·80	..	..	42·51
1872	..	..	0·80	2·95	1·78	15·28	13·29	11·60	13·10	11·30	2·30	1·90	74·30
1873	..	..	1·50	0·15	2·04	4·29	2·16	7·23	5·14	3·87	0·57	1·22	28·17
1874	0·55	0·12	0·62	1·80	4·70	9·26	10·17	16·82	7·73	8·95	2·42	..	63·14
1875	1·65	..	0·55	0·25	5·02	7·97	5·47	4·87	21·82	4·53	..	..	52·13
1876	..	..	0·40	0·25	2·45	3·05	4·92	11·85	10·32	5·87	..	..	39·11
1877	..	..	1·60	2·77	10·22	5·70	5·50	5·60	2·80	3·70	..	2·00	39·89
1878	..	0·60	4·00	0·60	5·30	5·10	9·90	15·85	10·10	8·70	2·00	5·40	67·55
1879	..	..	..	..	1·75	2·30	18·00	15·25	6·05	2·55	4·80	0·40	51·10
Total ..	3·76	1·66	14·37	12·90	38·83	64·03	88·74	103·00	96·22	61·25	15·37	10·92	511·05
Average ..	0·38	0·17	1·44	1·29	3·88	6·40	8·87	10·30	9·62	6·13	1·54	1·09	51·11
1880	0·10	1·20	0·21	1·80	4·68	11·16	13·31	8·14	9·47	4·95	0·20	..	55·22
1881	..	..	2·27	0·75	2·72	9·76	4·32	7·04	7·86	9·50	0·35	..	44·57
1882	0·40	..	..	2·37	3·32	2·20	8·00	4·95	10·12	4·10	1·06	0·30	36·82
1883	..	..	1·47	2·72	2·64	19·50	10·49	8·72	8·04	5·15	0·90	1·31	60·94
1884	..	1·02	0·13	1·95	0·90	4·35	8·30	3·10	12·90	6·15	0·25	0·65	39·70
1885	..	2·07	1·85	1·45	2·27	1·78	7·00	5·76	5·28	4·84	2·55	..	34·85
1886	0·12	..	4·62	0·03	4·43	6·75	4·98	12·61	13·06	14·70	5·00	4·31	70·61
1887	..	..	0·93	0·15	2·26	3·63	8·53	9·21	6·17	6·55	0·56	..	37·99
1888	0·74	1·47	..	1·45	0·26	2·70	6·82	6·66	8·89	0·97	8·36	..	38·32
1889	..	..	0·35	..	2·79	3·32	5·74	5·85	7·03	10·30	14·96	0·05	50·39
Total ..	1·36	5·76	11·83	12·67	26·27	65·15	77·49	72·04	88·82	67·21	34·19	6·62	469·41
Average ..	0·14	0·58	1·18	1·27	2·63	6·52	7·75	7·20	8·88	6·72	3·42	0·66	46·94

(2) *Surada rain-gauge*—cont.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1890	..	..	2·69	..	2·18	8·54	6·75	6·29	9·41	5·52	1·59	0·87	43·84
1891	..	0·23	6·19	2·38	4·77	1·20	3·90	11·66	6·80	2·27	1·03	..	40·43
1892	..	..	0·03	0·99	2·52	10·07	7·59	7·03	20·06	5·72	..	..	54·01
1893	3·30	1·18	4·16	0·88	4·09	7·47	9·47	7·89	9·47	4·38	0·44	..	52·73
1894	0·03	1·41	0·06	2·46	4·46	3·49	10·96	7·23	5·43	4·77	1·10	..	41·40
1895	..	1·05	0·38	2·77	2·33	13·87	6·57	11·40	6·74	6·35	0·50	..	51·96
1896	..	..	1·24	1·28	2·75	8·29	7·93	10·17	4·84	..	0·02	..	36·52
1897	0·05	3·49	0·50	2·89	3·91	4·77	6·82	8·67	11·22	10·26	1·51	..	54·09
1898	..	0·63	..	3·89	3·33	7·75	14·67	4·23	4·54	5·62	..	0·69	45·35
1899	..	0·17	0·15	4·96	1·69	4·34	6·81	13·35	8·32	10·28	..	0·02	50·09
Total ..	3·38	8·16	15·40	22·50	32·03	69·79	81·47	87·92	86·83	55·17	6·19	1·58	470·42
Average ..	0·34	0·82	1·54	2·25	3·20	6·98	8·15	8·79	8·68	5·52	0·62	0·16	47·04
1900	..	0·20	4·95	2·55	2·53	6·40	6·41	13·67	12·66	13·56	..	..	62·93
1901	0·84	3·18	0·60	3·67	4·05	5·26	14·51	8·18	7·97	3·34	3·60	..	55·20
1902	0·02	..	..	3·58	2·00	2·18	7·13	19·26	2·84	0·59	0·96	0·60	39·16
1903	1·20	1·36	1·02	1·09	2·59	4·57	10·02	10·25	13·83	8·32	1·59	3·81	59·65
1904	..	0·12	1·74	0·30	2·95	9·25	8·70	11·17	11·48	7·26	..	0·11	53·08
1905	0·03	0·32	6·61	2·69	4·05	2·93	9·73	12·51	7·45	2·74	0·03	..	49·09
1906	2·35	2·35	1·25	0·20	1·75	4·96	10·33	10·29	7·48	4·23	0·98	1·29	47·46
1907	..	0·63	3·73	4·68	2·46	7·78	11·15	5·89	5·76	1·73	1·06	0·80	45·67
1908	1·04	..	0·75	0·85	2·80	10·10	7·26	11·88	12·05	2·56	..	..	49·29
1909	0·01	1·07	0·50	6·92	3·08	8·32	10·41	6·60	8·36	2·95	..	5·07	53·20
Total ..	5·49	9·23	21·15	26·53	28·26	61·75	95·65	109·70	89·88	47·28	8·22	11·68	514·82
Average ..	0·55	0·92	2·12	2·65	2·83	6·18	9·57	10·97	8·99	4·73	0·82	1·17	51·48
1910	0·38	..	..	4·58	2·58	9·58	8·38	11·74	9·54	11·66	0·50	..	58·94
1911	..	..	1·77	0·44	2·08	13·06	3·42	5·73	16·22	2·88	0·47	3·93	50·00
1912	..	6·51	..	7·48	2·11	3·96	14·90	11·84	11·67	3·86	2·95	..	65·28
1913	..	2·92	0·50	0·88	5·76	6·45	11·47	7·84	7·88	9·47	1·27	..	54·44
1914	..	0·16	0·46	5·51	7·32	6·57	7·59	8·95	14·05	2·49	..	0·20	53·30
1915	0·51	0·92	0·36	4·05	5·54	10·94	6·20	7·15	8·49	10·17	5·10	..	59·43
1916	..	0·02	..	2·94	1·61	8·58	13·69	13·16	6·36	11·96	7·18	..	65·50
1917	..	4·54	0·15	4·22	3·09	9·93	9·06	17·75	13·09	14·98	0·98	0·05	77·84
1918	0·25	..	2·44	3·31	7·51	7·16	16·70	17·15	10·26	2·62	0·46	0·07	67·93
1919	3·55	7·76	2·05	6·16	7·71	24·00	25·59	19·29	10·38	11·39	11·62	..	129·50
Total ..	4·69	22·83	7·73	39·57	45·31	100·23	117·00	120·60	107·94	81·48	30·53	4·25	682·16
Average ..	0·47	2·28	0·77	3·96	4·53	10·02	11·70	12·06	10·79	8·15	3·05	0·43	68·22
1920	..	1·36	2·86	..	3·83	27·74	14·03	10·08	4·20	1·84	..	..	65·94
1921	1·63	0·03	..	1·37	1·14	11·14	18·62	13·20	29·24	2·88	..	..	79·25
1922	0·34	..	..	0·29	1·05	10·39	14·57	7·06	15·45	5·75	2·99	..	57·89
1923	..	3·91	..	2·10	3·18	7·19	15·43	4·95	12·06	14·62	..	..	63·44
1924	1·44	0·12	..	..	10·55	4·75	3·86	7·52	12·95	9·95	14·99	..	66·13
1925	..	..	0·19	3·22	9·72	28·99	10·70	28·06	18·06	22·90	..	0·31	122·15
1926	5·32	3·24	3·55	5·34	4·62	6·61	7·43	12·80	9·80	3·00	..	..	61·71
1927	0·04	0·42	0·20	0·88	2·82	13·82	11·23	10·84	4·18	3·50	5·46	..	53·39
1928	..	..	..	2·17	3·52	8·16	12·39	7·63	7·95	9·58	..	..	51·40
1929	0·95	1·48	..	2·31	2·20	7·82	5·85	10·83	8·36	7·82	..	0·50	48·12
Total ..	9·72	10·56	6·80	17·68	42·63	126·61	114·11	112·97	122·25	81·84	23·44	0·81	669·42
Average ..	0·97	1·06	0·68	1·77	4·26	12·66	11·41	11·30	12·23	8·18	2·34	0·08	66·94

(3) *Mojjagoda Forest rain-gauge from* 1919 *to* 1929.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1919	1·60	2·40	1·20	2·60	3·60	12·80	12·80	19·60	7·40	7·20	2·00	0·80	74·00
1920	0·60	..	4·20	..	4·40	4·80	10·00	8·80	8·00	2·00	..	..	42·80
1921	1·54	1·00	0·60	..	..	5·28	13·16	8·40	10·80	..	..	..	40·78
1922	..	..	..	0·08	3·90	12·50	8·60	12·00	6·80	2·80	..	..	56·68
1923	..	0·80	..	..	2·80	9·30	5·60	4·40	9·60	7·60	2·40	..	42·50
1924	2·40	..	..	1·60	4·40	1·60	3·60	17·20	7·20	6·00	2·80	..	46·80
1925	..	..	..	8·08	6·80	1·88	7·40	15·60	8·40	8·40	0·68	2·36	59·60
1926	0·68	..	4·12	1·80	2·00	4·40	9·80	14·40	9·80	3·00	..	..	50·00
1927	..	..	..	7·74	..	11·70	11·70	..	14·36	5·40	3·20	..	54·10
1928	..	..	..	..	..	..	11·20	10·72	12·20	11·52	..	..	45·64
1929	1·60	0·40	0·26	0·36	1·60	9·60	4·40	9·10	10·30	3·40	..	..	41·02
Total ..	6·82	2·20	9·18	19·66	25·90	61·06	85·46	100·62	107·46	50·12	9·08	2·36	479·92
Average ..	0·68	0·22	0·92	1·97	2·59	6·11	8·55	10·06	10·75	5·01	0·91	0·24	47·99

(4) *Tarasingi Forest rain-gauge from* 1919 *to* 1929.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1919	1·60	5·00	0·80	0·80	1·60	17·50	16·70	7·70	12·00	3·70	5·30	..	72·70
1920	0·10	0·40	1·20	2·00	1·60	4·80	9·90	4·78	7·20	1·70	..	..	33·68
1921	2·90	1·00	..	1·70	..	10·60	12·20	5·40	12·90	1·10	..	..	47·80
1922	0·80	..	..	1·40	2·20	16·00	8·20	12·30	19·40	5·20	0·40	..	65·90
1923	0·50	2·40	0·40	..	2·90	2·28	11·80	4·60	12·80	5·84	6·60	1·30	51·42
1924	2·60	..	..	..	..	2·40	47·60	9·00	16·20	4·00	9·00	..	50·80
1925	..	..	0·25	3·60	6·80	11·75	6·80	3·20	8·00	5·60	..	..	46·00
1926	2·80	..	6·00	1·20	1·20	3·00	3·90	24·50	12·12	..	..	..	54·72
1927	..	1·40	..	2·80	2·80	8·33	0·80	8·68	11·40	8·60	..	1·56	46·37
1928	..	..	..	0·20	..	12·30	14·80	15·00	14·80	..	..	..	57·10
1929	..	0·40	0·80	2·80	4·00	4·00	6·80	7·60	17·60	2·40	..	..	46·40
Total ..	9·70	5·60	8·65	15·70	21·50	75·46	82·80	95·06	132·42	34·44	16·00	2·86	500·19
Average ..	0·97	0·56	0·87	1·57	2·15	7·55	8·28	9·51	13·21	3·44	1·60	0·29	50·02

(5) *Kurcholi Forest rain-gauge from* 1919 *to* 1929.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
1919	2·40	5·60	1·00	0·72	2·60	9·80	6·72	11·60	4·80	3·20	6·40	..	54·84
1920	..	2·40	0·80	4·40	1·60	11·80	11·60	6·80	8·80	13·12	..	..	61·32
1921	1·60	..	0·40	0·20	0·80	5·80	5·20	7·20	11·80	4·40	..	..	37·40
1922	..	..	1·20	..	2·80	10·80	13·80	18·40	10·80	0·50	1·20	..	59·50
1923	..	2·56	..	2·00	0·52	7·20	12·06	3·72	7·84	3·94	3·95	0·50	44·29
1924	0·20	..	..	0·80	1 00	3·60	8·00	3·73	12·40	0·38	1·00	..	31·11
1925	..	..	0·90	0·20	0·72	1·84	0·84	1·40	0·68	1·00	..	..	7·58
1926	..	..	0·52	0·16	0·60	3·60	2·80	1·08	1·52	16·00	..	..	26·28
1927	..	..	..	..	0·80	..	..	0·80	4·32	15·98	..	..	21·90
1928	..	..	..	..	0·80	..	11·60	14·00	7·60	10·40	..	..	44·40
1929	..	1·80	..	..	0·96	14·40	7·00	8·20	10·20	8·00	..	..	50·56
Total ..	1·80	6·76	3·82	7·76	10·60	59·04	72·90	65·33	75·96	73·72	6·15	0·50	384·34
Average ..	0·18	0·68	0·38	0·78	1·06	5·90	7·29	6·53	7·60	7·37	0·62	0·05	38·43

(6) *Rogoda Forest rain-gauge from* 1919 *to* 1929.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
1919	3·20	6·20	1·20	1·60	4·40	12·80	10·80	12·40	4·00	5·60	8·00	..	70·20
1920	..	..	3·20	2·80	0·40	7·60	8·40	4·80	5·60	0·80	..	..	33·60
1921	2·40	..	..	0·80	1·20	5·40	9·80	5·20	14·00	2·80	..	..	41·60
1922	0'40	..	..	..	3·20	4·80	12·00	8·40	14·00	2·80	1·60	..	47·20
1923	..	2·00	..	1·20	1·60	5·20	7·60	4·80	12·00	10·00	4·40	..	48·80
1924	1·20	..	..	4·00	3·60	1·60	5·60	8·40	1·16	8·40	10·40	..	44·36
1925	..	..	..	2·00	8·40	10·40	5·80	14·00	4·80	7·40	..	..	52·80
1926	1·60	4·00	4·80	4·80	4·00	5·20	6·00	11·06	12·00	2·60	..	..	56·06
1927	..	0·80	..	1·60	5·02	11·20	11·20	12·00	..	5·60	5·60	7·20	60·22
1928	..	..	..	4·40	4·80	..	11·20	12·00	12·20	8·40	..	..	53·00
1929	..	..	..	1·20	4·00	12·00	7·20	16·80	14·80	6·20	..	..	62·20
Total ..	5·60	6·80	8·00	22·80	36·22	63·40	84·80	97·46	90·56	55·00	22·00	7·20	499·84
Average ..	0·56	0·68	0·80	2·28	3·62	6·34	8·48	9·75	9·06	5·50	2·20	0·72	49'98

(7) *Ramnabady Forest rain-gauge from* 1919 *to* 1929.

Year	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
1919	3·00	2·10	1·90	2·00	4·00	13·60	12·00	6·00	5·60	2·00	2·00	0·60	54'80
1920	2·50	..	1·60	..	2·00	4·90	7·20	8·04	6·80	2·00	..	..	35·04
1921	0·80	..	..	1·80	2·10	7·80	12·80	6·40	16·40	2·00	..	..	50·10
1922	0·50	..	..	..	3·00	6·40	8·20	5·20	15·50	3·20	3·80	..	45·80
1923	1·20	0·60	0·60	4·80	4·40	4·00	8·20	4·00	10·20	7·00	..	..	45·20
1924	..	0·20	0·20	..	4·00	1·60	7·60	5·80	22·60	13·80	10·80	0·60	67·20
1925	..	..	..	3·60	5·20	10·00	7·60	15·20	8·80	14·80	..	..	65·20
1926	..	..	2·00	1·60	3·20	2·40	8·40	17·60	7·60	1·60	..	..	44·40
1927	..	..	..	0·90	..	10·00	8·80	10·80	8·40	8·00	8·00	..	54·90
1928	..	..	..	..	..	..	7·20	5·20	7·60	10·00	..	..	30·00
1929	1·20	..	..	2·40	2·80	9·06	4·20	9·40	8·80	8·60	..	..	46·46
Total ..	6·20	0·80	4·40	15·10	26·70	56·16	80·20	87·84	112·70	71·00	22·60	0·60	484·30
Average ..	0·62	0·08	0·44	1·51	2·67	5·62	8·02	8·78	11·27	7·10	2·26	0·06	48·43

APPENDIX II.

Number of Carts available in each village in Ghumsur.

Serial number and name of village.	Carts available.
A.—*Ghumsur taluk.*	
1. *Russellkonda Firka.*	
1. Nowgam	44
2. Dhimiripalli ..	10
3. Sanokodanda ..	24
4. Sardulo	11
5. Dondipadoro ..	10
6. Podhalo	40
7. Jampalli	17
8. Dindipalli	18
9. Pattsauli	..
10. Mandara	13
11. Thengadhoro ..	8
12. Bodokodanda ..	69
13. Sannopothara ..	5
14. Gudipadaro ..	3
15. Tiliki	..
16. Purunapani	..
17. Modhupur	..
18. Gundribadi	..
A.—*Ghumsur taluk*—cont.	
1. *Russellkonda Firka*—cont.	
19. Kaliamba	1
20. Budiamba	1
21. Inginati	34
22. Rothongo	16
23. Rajakundu	11
24. Lalsingi	16
25. Vinjigiri	21
26. Jogimari	20
27. Russellkonda Reservoir	..
28. Konipalli	19
29. Bhallyakhai ..	29
30. Mudulipalli	11
31. Jillundi	62
32. Koindi	14
33. Molaspadaro ..	8
34. Gamundi	64
A.—*Ghumsur taluk*—cont.	
1. *Russellkonda Firka*—cont.	
35. Russellkonda (Bhejjiputi) ..	115
36. Baunsolundi ..	20
37. Bherada	6
38. Dhowpalli	..
39. Dhamanajholi ..	4
40. Sanopalli	6
41. Battadi	27
42. Ogojholo	16
43. Pattuleti	24
44. Dhunvasayi ..	8
45. Kontadoro	8
46. Dubuduba	3
47. Mohulia	9
48. Narayanapur ..	11
Total ..	856

A.—*Ghumsur taluk*—cont.

2. *Kullada Firka.*

Serial number and name of village.	Carts available.
1. Kullada	32
2. Notapalli	..
3. Kotibiradi	12
4. Baruda	43
5. Billipada	..
6. Ondharikot	3
7. Gujarali	20
8. Kotipada	40
9. Javulai	10
10. Kasakendupalli	..
11. Boribandho	2
12. Sano Tulisipalli	..
13. Turumu	38
14. Sorisomuli	11
15. Kathachira	11
16. Berunabadi	10
17. Galleri	51
18. Rongameru	3
19. Dholopitta	14
20. Brahmanpadaro	25
21. Jhaliagochha	9
22. Billuvapada	11
23. Ranikiari	10
24. Narigochha	3
25. Kupati	3
26. Dhimirijholi	..
27. Horigodo	23
28. Kalijhiri	..
29. Gudibondho	..
30. Bodangi	6
31. Gorudu	3
32. Dhomuhani	24
33. Raigochha	..
34. Gundribadi	..
35. Khomonosai	..
36. Tilisingi	31
37. Gangajholo	..
38. Chodhiapalli	7
39. Uldano	2
40. Tangono	14
41. Bhakapalli	1
42. Pothrapalli	14
43. Hojopalli	1
44. Beniapalli	..
45. Bankathora	39
46. Kuduthai	47
47. Gotholunda	6
48. Pratapur	12
49. Potharapalli	18
50. Otaraipalli	1
51. Londabilli	..
52. Ponthikhadi	14
53. Gundribadi	2
54. Bellokiari	5
55. Buropalli	7
56. Dhananjayapur	20
57. Raipalli	11
58. Gollapada	15
59. Arkhapalli	5
60. Gopinathpur	19
61. Matikani	5
62. Agulopada	3
63. Krishnasaronopur	9
64. Niladripur	3
65. Kopara	6
Total	734

3. *Bellagunta Firka.*

Serial number and name of village.	Carts available.
1. Pandripada	6
2. Bijay Dhananjayapur.	10
3. Sirikoi	3
4. Kukulunda	35
5. Ballidi	36
6. Rajonopalli	9
7. Bijay Lakhmisaranpur.	15
8. Sodongayi	12
9. Bijay Krishnasaranpur.	2
10. Kojiripalli	..
11. Vorigodo	2
12. Ballibhago	5
13. Koithopalli	3
14. Boropalli	14
15. Jirandi	38
16. Potharapalli	8
17. Bamdevpur	9
18. Chothabero	..
19. Borogam	22
20. Odaigam	20
21. Dongapadaro	29
22. Gobara	23
23. Nimopadaro	37
24. Khamaropalli	9
25. Tikkiripada	34
26. Gajendra	47
27. Udhra	23
28. Ambopua	50
29. Bojorogodo	4
30. Tonorada	23
31. Kumlayi	16
32. Bodopoda	20
33. Moraipatto	3
34. Netanga	49
35. Madhavobarida	13
36. Benipalli	45
37. Bonka	28
38. Surumoni	3
39. Jatrosoni	7
40. Jilluba	32
41. Girisola	40
42. Bellagunta	66
43. Banithumbo	33
44. Mentopur	32
45. Thenthullia	12
46. Sorisomulo	8
47. Berhampur	22
48. Kebripalli	12
49. Sothumusoro	35
50. Soropolinuvapalli	5
Total	1,009

4. *Mojjagada Firka.*

Serial number and name of village.	Carts available.
1. Mojjagada	77
2. Badiagam	1
3. Buduli	21
4. Baliapatta	4
5. Biripodaro	10
6. Sutangi	4
7. Khoropuri	8
8. Khariguda	8
9. Ballatuni	3
10. Dodorolunda	30
11. Poitagam	14
12. Sadulugam	5
13. Rambha	14
14. Benniguba	4
15. Gundribadi	32
16. Kondikotti	18
17. Goiribadi	17
18. Durgaprasad	6
19. Mahaguda	16
20. Chittipalli	1
21. Danguvapalli	3
22. Soropada	1
23. Dhowmundia	2
24. Rambhapalli	2
25. Baiballi	26
26. Bojorokot	4
27. Birikot	9
28. Dummakumpa	14
29. Khommarida	46
30. Bahadapadaro	12
31. Gurabadi	7
32. Indagodo	3
33. Darpangia	9
34. Kannubandho	1
Total	432

5. *Gerada Firka.*

Serial number and name of village.	Carts available.
1. Badogundribadi 2. Naranoguda	16
3. Gerada	28
4. Kepati	9
5. Pochalundi	4
6. Manopur	15
7. Bontha	4
8. Kirapalli	..
9. Sisunda 10. Khetamundali 11. Billuamara 12. Gramadevathi 13. Thirigochha	11
14. Gayagonda	40
15. Jiripada	..
16. Durungi	..
17. Suili	..
18. Rudapadaro	8
19. Kodiligodo	3
20. Gogodo	5
21. Badhobhumi	2
22. Bhogara	2
23. Kathopathni	..
24. Naragadu	..
25. Nabogochha 26. Budabari 27. Talokomono 28. Khojiripalli 29. Budrungu 30. Dangibhumi	9
31. Kukuluba 32. Dongabhumi 33. Hathiguda	19
34. Soppongo	..
35. Horodapadaro	7
36. Chudakhai	..
37. Somorobandho	15
38. Lembhai	37
39. Ballisai	7
40. Kadholundi	18
41. Holondokhola	15
42. Sunnapalli	1
43. Somarada	9
44. Jadadharo	30
45. Mosabadi	15
46. Kolingopadaro	21
47. Tolludi 48. Tarasingi 49. Gorogodopatharo 50. Barodanda	14
Total	364

6. *Jagannadaprasad Firka.*

Serial number and name of village.	Carts available.
1. Pattadhar	22
2. Paikirapalli	11
3. Alladi	15
4. Kadhapada	15
5. Tholanda	12
6. Kumunda	14
7. Chamunda	24
8. Dhodapalli	8
9. Bhuktabhumi	12
10. Ranibhumi	8
11. Chopra	8
12. Chikili	7
13. Noda	14
14. Sorokumpa	10
15. Jirabadi	26
16. Pellapada	3
17. Leppa	1
18. Budringi	14
19. Sisunda	13
20. Nuapalli	3
21. Jaiko	15
22. Udayapur	6
23. Korasingi	28
24. Kumpapada	43
25. Panchabhuti	54
26. Tikarapalli	12
27. Koiranati	4

Serial number and name of village.	Carts available.
A.—*Ghumsur taluk*—cont.	
6. Jagannadaprasad Firka—cont.	
28. Begunadiha	5
29. Chodiapalli	32
30. Kusapalli	2
31. Jhadasai	4
32. Jatra	4
33. Kuduva	9
34. Gundrisahi	7
35. Mohuliya	13
36. Jodabandho ..	1
37. Allasu	15
38. Konsoro	24
39. Singipur	1
40. Goniapalli	1
41. Routi	22
42. Charikonia	3
43. Dungapalli	1
44. Bhabosoro	7
45. Ponkalo sahi ..	5
46. Molengi	5
47. Jagannadaprasad ..	29
48. Taloponka	1
49. Haripur	5
50. Jamagorida ..	6
51. Tamanada	6
52. Kondrasingi ..	18
53. Kandho Nuapalli ..	15
54. Jadabhumi	12
55. Bevulapalli	6
56. Mangarajpur ..	7
57. Ajuyaprasad ..	8
58. Jagannathpur ..	4
59. Gandadhar ..	16
60. Gochhabadi ..	16
61. Kumundi	10
Total ..	722
7. Ballipadaro Firka.	
1. Ballipadaro ..	44
2. Kolombo	9
3. Sadasivapur sasano.	10
4. Arkhapur	63
5. Ponkalbadi	16
6. Tangidi	18
7. Tikkarapada ..	13
8. Konchuru	28
9. Yekadalo	11
10. Jholumi	9
11. Kholokhali	30
12. Bellopur	5
13. Bennujholo ..	..
14. Talosakaro	25
15. Behra Baroda ..	4
16. Kanosuka	14
17. Gandia Barada ..	21
18. Bellopada	5
19. Kandho paikarapalli.	2
20. Antarapada ..	48
21. Kandhochandan-pedhi.	1
22. Ghodapada	42
23. Sunakuva	27
24. Ramogodo	30
25. Kathapada	13
26. Vishnuchakram ..	75
27. Koradabadi ..	42
A.—*Ghumsur taluk*—cont.	
7. Ballipadaro Firka—cont.	
28. Serudo	18
29. Mogulupur	35
30. Gothili	10
31. Pratapdhananjeya-pur sasan.	14
Total..	682
8. Buguda Firka.	
1. Chirikipada ..	25
2. Betharonoyi ..	27
3. Ramanda	20
4. Aadipur	51
5. Kaddapada ..	..
6. Panikesaro	17
7. Koradabadi ..	30
8. Manithara	38
9. Makarapalli ..	3
10. Tamberi	5
11. Gholopur	14
12. Kanokuturu ..	17
13. Sunkuru	14
14. Bhogada	9
15. Chillikomo	25
16. Sollundi	9
17. Golabandho ..	11
18. Mothabadi	36
19. Dakarabadi ..	10
20. Jhatikapalli ..	1
21. Nagiri	2
22. Thonapalli	2
23. Horisaranpur ..	11
24. Biirodhananjayapur.	4
25. Krishnasaranpur ..	6
26. Birinchipur ..	49
27. Gollya	35
28. Saturusoko	4
29. Korchuli	27
30. Singipur	5
31. Jhadapada	5
32. Kriamba	..
33. Bodotoila	..
34. Bhavasaro	20
35. Saradapur	31
36. Kadhapada ..	..
37. Buguda	53
38. Golandula	10
39. Bhamsyali	20
40. Kuvanalo	2
41. Chodiapalli	
42. Bhogavanpur ..	38
43. Takkarada	26
44. Mothaghai	9
45. Dengabadi	7
46. Konaipur	7
47. Konchilipada ..	6
48. Kansorla	..
49. Koilasanogam ..	..
Total ..	764
B.—*Surada taluk*.	
9. Surada Firka.	
1. Moyangi	8
2. Dheppapalli ..	14
3. Osurobandho ..	40
B.—*Surada taluk*—cont.	
9. Surada Firka—cont.	
4. Hathiguda	6
5. Jayasingi	2
6. Genja	8
7. Peruju	8
8. Sundideho palli ..	5
9. Bondhagochha ..	6
10. Brahmankotibadi ..	18
11. Balyapada	4
12. Pettagada	2
13. Mukapalli	7
14. Amurtuli	69
15. Koktaguda	11
16. Ballighai	11
17. Pippalaponka ..	2
18. Sano Khairokutti ..	1
19. Dantalingi	13
20. Sanogonda	3
21. Uporo Dantalingi ..	10
22. Bhagvanpur ..	73
23. Murgapalli	2
24. Surada	80
25. Hukuma	12
26. Khariguda	30
27. Soronouthi	15
28. Baroprodhani ..	3
29. Saradaballi	2
Total ..	465
10. Surumuni Firka.	
1. Kullangi	54
2. Latipada	40
3. Surumoni	48
4. Nuagodo	55
5. Palakato	49
6. Baisimo Kotibadi ..	1
7. Gopalpur sasan ..	4
8. Dhobadi	3
9. Gurandia	1
10. Rogada	6
11. [illegible]illabadi	3
Total ..	264
C.—*Pondakhol Agency*.	
11. Pondakhol Mutha.	
1. Gazulabadi	11
2. Rubbangi	2
3. Ramanbadi ..	1
4. Khojiripalli ..	8
5. Mahaguda	14
6. Saroponka	5
7. Gendabadi	3
8. Gudari	1
9. Kalama	2
10. Jutrama	2
11. Gochha	11
12. Mallipanka	1
13. Dabuki	5
14. Ballapanka	5
15. Kumbhikota ..	1
Total ..	72

ABSTRACT.

	Number of carts.
A.—Ghumsur taluk.	
1. Russellkonda firka.	856
2. Kullada ,,	734
3. Bellagunta ,,	1,009
4. Mojjagada ,,	432
5. Gerada ,,	364
6. Jagannada-prasad. ,,	722
7. Ballipadaro ,,	682
8. Buguda ,,	764
Total for the taluk ..	5,563
B.—Surada taluk.	
9. Surada firka ..	465
10. Surumuni firka ..	264
Total for the taluk ..	729
C.—Pondakhol Agency.	
11. Pondakhol Agency.	72
Total for the taluk ..	72
Grand total ..	6,364

APPENDIX III.

Detailed History of the Ghumsur Forests, 1850 to 1930.

Note.—(1) The history was prepared by Mr. S. Cox up to 1901; from 1901 to 1912 by Mr. H. C. Bennett; from 1913 to 1919 by Mr. A. F. Minchin and from 1919 to 1930 by the present Working Plans Officer.

(2) Yield, revenue and expenditure are given for the whole of Ganjam district covering the seven Ghumsur ranges, the Berhampur range and the Balliguda Agency. The last unit came under the charge of the District Forest Officer from 1st July 1927.

(3) The yield relating to the Ghumsur forests has been dealt with in paragraphs 175 to 177 of Part I. The revenue and expenditure have also been given in paragraphs 178 to 180 of Part I.

A. Period, 1850 *to* 1901.

The Ghumsur forests came under administration about 1850, but there was little attempt made at silvicultural treatment till about 1890.

In 1851, so far as records show, the first attempt to turn the forests to account was made by Mr. G. Williams who entered upon a contract for railway sleepers. The timber was found superior but for some reason or other the contract failed. In 1855 and 1856 a large quantity of sal appears to have been felled for the Commissariat Department. In 1858 the Collector, Mr. W. Knox, urged the introduction of measures for economy and preservation of the forests, and issued orders against the indiscriminate felling of trees for extension of cultivation and to meet the demand of the towns and larger villages. No system of conservancy was enforced as a result. At this time the forests had not been systematically examined and means of communication were few. The road from Berhampur to Russellkonda had been made but the present extension to Balliguda had been cleared only as far as Durgaprasad. In 1859 the Conservator, Doctor Cleghorn, toured in Ghumsur and recommended the appointment of overseers to superintend felling of sal timber, the floating of rafts to Ganjam and the subsequent shipping of the sal timber to Madras. A forest tax was instituted in 1861. In 1861 Mr. John Brown was appointed overseer in charge of the Ghumsur forests. His establishment was two peons. He submitted a report on the character and extent of the forests to the Conservator in 1863. In his report it appears that the forests were already largely denuded of fine timber owing to the unrestricted onslaughts of the public, previous to the imposition of the forest tax and to the subsequent lack of sufficient protective establishment. In 1865 Mr. Gniezlar was appointed in charge of the Ghumsur and Surada ranges, but was replaced in the same year by Mr. Maccally. In 1864–65, 1,000 sal logs were felled and some of them brought down to the coast for transport to Madras. In addition to this, timber worth Rs. 2,990 was purchased by the Public Works Department, who for the first time were called upon to pay the value of the timber required by them in Ghumsur. Receipts for seigniorage collections on timber amounted to Rs. 2,742. In 1866, a year of severe famine, Mr. Maccally submitted a detailed report to the Conservator, Captain Beddome, in which he mentioned the increasing difficulty of obtaining large-sized timber and the way in which the Buguda and Ronaba Zamindari contractors undersold Government in the matter of inferior sal logs. The establishment was increased by the appointment of a clerk and eight peons. During the year 1,143 sal logs were felled and carted to Russellkonda. Some of these subsequently reached depots in Aska and Gopalpur. In 1866–67 an attempt was made to close about six square miles of forest round Surada and part of the present Mojjagoda and Russellkonda ranges to felling. Timber for the Berhampur jail and the Aska bridge was supplied. The latter included piles 25 to 27 feet long and four logs, 24 feet long.

Great difficulty was experienced in rafting and some of the timber never reached its destination. An attempt to float 72 very large logs from Kukuluba towards Russelkonda was also a failure. The net profit of the year's administration was Rs. 8,663. During 1867–68 definite areas of sal forests were set apart for the supply of sal timber to Government departments. The Department of Public Works received 424 sal logs during the year chiefly for the Chilka Lake canal work. During 1868–69 the overseer in charge brought to notice that the privilege accorded to ryots of removing unreserved trees free of charge for their own wants was being abused and that much sal and other good timber were being removed on this pretext. Sal timber was supplied during the year for the following works: Berhampur Jail, Munsif's Court and Taluk Cutcherry, Chilka canal, Ganjam jail, Sompeta cutcherry and roads. In 1869–70, the Collector issued orders to protect the forests from encroachments by cultivators and a list of protected trees was again circulated. The free supply of timber to rebuild burnt villages was as usual a large item. Sal timber was supplied to the Public Works Department at Vizagapatam as well as locally. In 1872, the Ranger reported that 50,000 cubic feet of timber was removed from the forest to rebuild burnt villages and the overseer deprecated the large drain in the forests caused by the people's carelessness. Fifty-six thousand cubic feet of timber and 390 tons of fuel were removed on seigniorage. In 1874, the Board passed orders on the supply of fuel to Aska Factory on favourable terms. The Collector expressed himself as dissatisfied with the want of systematic conservancy. In 1879 the Conservator classed the forests under four heads, (1) 100 square miles of really good sal forest, (2) 100 square miles of poor sal forest, (3) 100 square miles of mixed forest and (4) 180 square miles of poor scrub forest and proposed that 150 square miles should be reserved and 100 square miles protected. The Ranger was ordered to take up reservation mutta by mutta and prepare maps of the proposed reserves.

The Superintendent of the Madras Harbour Works negotiated for the supply of 6,900 sal sleepers, to be paid for at actual cost plus seigniorage and cost of supervision. Colonel Beddome, Conservator, inspected the forests again. Mr. Maccally died after being in charge of the Ghumsur forests from 1865 to 1878 and was succeeded by Mr. Dampier. In 1880, a suggestion was made

and approved by the Conservator to lease the Korada and Ronabha forests to put a stop to theft from Government forest under cover of zamindari permits; but was not carried out. In 1881 definite proposals for reservation were made by the Ranger and supported by the Collector and Conservator, but the Board ordered the matter to lie over until the Forest Act was passed and the report of the Forest Committee received. In 1882, the question of overworking again came up and the Sub-Assistant in charge proposed to restrict felling to the more thickly wooded tracts. Six thousand and six hundred sleepers, derived largely from logs previously left lying in the forests, were sold to Messrs. Stephenson and Company. The Conservator in his report to the Board stated "There is no better illustration than this of the reckless waste and extravagance that has been allowed for want of adequate supervision." Orders issued by the Collector with regard to the control of timber traffic from private forests were reported to have been followed by highly satisfactory results. The Forest Act was passed in 1882. In 1883–84 Mr. Gamble, the Conservator, made a long tour in Ghumsur and advised the reservation of certain blocks of forest. He reported that all forests in the Mojjagoda range, except Rambha, were being much and carelessly cut about by sleeper contractors, "who are fast getting rid of every tree fit to give one broad gauge sleeper, and if not stopped at once will leave the forests bare of all trees fit to cut within the next 40 years." The Rambha reserve was described as containing good sal in its valleys. The Conservator's report also says "The large sal forests which occupies the country south of Chandragiri contained a few years ago a splendid crop of large sal. I regret to say that wasteful and reckless fellings induced by the system of selling sal by permits by the bandy load has resulted in the greater part of the old trees being felled and left lying on the ground with one ten-foot piece cut out of them and no more." As a result of the Conservators' tour, draft notifications for a number of large blocks containing approximately 600 square miles were submitted to Government and gazetted for settlement under the Forest Act.

The ranges of Surada, Mojjagoda, Kukuluba and Kurcholi (afterwards called Buguda) were also constituted. Mr. A. W. Lushington, the first trained officer appointed to these forests, took charge in 1883–84. In 1884–85 demarcation was begun and the means of communication for carting timber improved.

In 1885–86 the Deputy Collector, Ghumsur, did forest settlement. In 1886–87 grazing restrictions were introduced in the recently notified reserves. In 1887–88 part of the Vizagapatam forests were also placed under Mr. Lushington's charge on account of shortage of officers. Three reserves were settled of which one was notified. Mr. Lushington made the following rough working arrangement for the Ghumsur forests, (1) complete rest for the forests overworked under the old permit system, (2) coppice with standards in forests where ill-treatment had been extreme, and (3) selection fellings for the rest of the forests by compartments. The extent to which this scheme was carried out is not evident from records. The forests were divided into east and west Ghumsur subdivisions, and the headquarters of the District Forest Officer transferred from Russellkonda to Chatrapur.

In 1888–89, 73 miles of demarcation was done, bringing up the total of more or less temporary demarcation to 621 miles out of a total of 974 miles to be cleared. Some departmental survey was done. A few of the reserves were thrown open to free grazing, on account of drought and want of pasture. The Kullada-Tilisingi road was begun, and much work in constructing rest-houses. The Conservator suggested tramways to facilitate extraction of timber. In 1889–90, a year of scarcity and floods the Conservator visited the forests. Some fire traces were cut in Kullada reserve. Construction of roads and several rest-houses was taken up. The Kullada-Tilisingi road work was handed over to the officer in charge of famine works who did not complete it. 2,108 sal trees yielding logs were felled and 9,809 sleepers. About 9,000 cubic feet of timber and firewood were washed away by floods. In 1890–91 Mr. Battie took over charge from Mr. A. W. Lushington and sleeper operations were put a stop to as they resulted in pecuniary loss and waste of timber. The prices recovered are given below :—

Sleepers supplied from April 1889 to June 1900.

Number and description.		Value.		
		RS.	A.	P.
1,936 sal 10 feet sleepers at Rs. 3–6–0	.. ..	6,534	0	0
270 sal 10 feet rejected at Rs. 2–6–0	.. ..	641	4	0
9,733 sal 6 feet sleepers at Rs. 1–2–0	.. ..	10,949	10	0
100 sal 6 feet sleepers at Rs. 1–14–0	.. ..	187	8	0
	Total ..	18,312	6	0

The timber that had been left lying in the forest was taken to Russellkonda sale depot. 2,677 trees were felled for fuel and 222 for timber. 946 trees of fuel were rafted to Aska Factory and sold for Rs. 2,031. Anicuts being put across the Rushikulya river put a stop to further operations of this kind. Kullada-Tilisingi road was completed at a cost of Rs. 952. Forty-five miles of boundary were cut at a cost of Rs. 720.

In 1891–92 the collection and record of statistics of yield for each reserve was begun. Sample plots of quarter acre each were selected in two reserves to determine sal growth. 193 square miles only were placed under fire-protection, instead of all reserves as in previous years. Eight hundred acres of climber cutting in Gallery and Chendragiri reserves was done. Tarasingi road costing Rs. 636, and Rambha-Nicktapalli road costing Rs. 719, were completed. Forty-five miles of

demarcation costing Rs. 720 was done. 839 trees in unreserves were felled in order to prevent their destruction by extension of cultivation. 3,852 logs felled in previous years and left lying in the forest were carted to sale depots.

In 1892–93 the forest year was adopted. Fire-protection (nominal) was extended to 202 square miles. The collection of grazing fees at half maximum rates was commenced. 1,900 acres of climber cutting in Gallery and Chendragiri reserves was carried out at a cost of Rs. 355. The cutting of inspection paths was started, 15 miles being cut at a cost of Rs. 691. Nineteen rest-houses were brought on the list of completed buildings. Thirty-one miles of demarcation was done at a cost of Rs. 209. 664 trees were felled departmentally in unreserves. Permits were for the first time issued for the removal of marked sal trees from unreserves. 1,392 trees valued at Rs. 9,169 were thus removed during the year.

In 1893–94 an attempt was made to introduce the system of located fellings in the Rayapada reserve for the supply of fuel to Aska factory, but contractors were not forthcoming to undertake the work. Area under fire-protection was increased to 208 square miles. Climbers were cut (vide margin) at a total cost of Rs. 350 24½ miles of inspection paths were cut at a cost of Rs. 1,002. Eighty-two miles of permanent demarcation was done at a cost of Rs. 1,102. The Railway department bought 11,000 sal trees for Rs. 88,000, most of these trees were removed from Chokkapad forests. Permits were issued to private persons for the removal of 1,200 sal trees from unreserves. Also 387 sal trees were felled departmentally in unreserves.

Reserve.	ACS.
Gallery	1,200
Kurcholi	650
Chendragiri	2,500

In 1894–95 the Forest Act was extended to Pondakhol. Permission was given to the inhabitants of some 250 villages in Ghumsur to remove all timber save reserved trees from unreserves free of charge for their own wants—vide Board's Proceedings Forest Mis. No. 1060, dated 15th August 1894. The Forest Department was required to remove the timber of value on waste lands granted on patta in Ghumsur leaving other trees free of charge to the darkhastdar. An improvement felling over 20 acres was made in Kaliamba reserve as an experiment. The cost was Rs. 20 and the yield Rs. 81. Thirty-eight miles of inspection paths were cut at a cost of Rs. 1,600; 56 miles of permanent demarcation was done at a cost of Rs. 452. 11,377 acres of climber cutting was done at a cost of Rs. 830. * Only 87 sal trees were felled departmentally in unreserves and departmental operations were stopped, as purchasers preferred to purchase standing trees. Mr. McIntosh took over charge of the district from Mr. Battie in August 1895. In 1895–96 the Board Member visited the district with the Conservator to discuss settlement matters with the Collector and District Forest Officer. Forest settlement was transferred to a Special Forest Settlement Officer. Mr. O. Leary was deputed to demarcate the Maliah boundary. Twenty miles of inspection paths were cut at a cost of Rs. 455. Two hundred and forty-two sal trees were felled departmentally in reserves in Mojjagoda and Kukuluba ranges, the yield being about 9,000 cubic feet of which 5,500 cubic feet were supplied to the Ordnance Department at Re. 1 per cubic foot after being carted departmentally to Gopalpur. Mr. O. Leary succeeded Mr. McIntosh in January 1897. In 1896–97 T.T. rules were introduced and a reorganized staff of forest guards entertained. Mr. O. Leary completed the Maliah boundary demarcation by cutting 46 miles at a cost of Rs. 1,548 between March 1896 and August 1897. A sum of Rs. 29,139 was refunded to the Railway department being unworked off balance of Rs. 88,000 paid by the Railway in 1893–94 for sal trees. Twelve miles of inspection paths were cut at a cost of Rs. 550. Eleven miles of reserve boundary were cut at cost of Rs. 126. Five thousand cubic feet of sal timber were supplied to the Ordnance Department at Re. 1 per cubic foot. In 1897–98 the increased rates of grazing fees sanctioned in Board's Proceedings Forest No. 83, dated 21st February 1897, were introduced. Four miles of inspection paths were cut at a cost of Rs. 132. A road from the Tiliki-Rogode reserve boundary to Surada range limits was completed at a total cost of Rs. 1,056. Fifty-three miles of permanent demarcation was done at a cost of Rs. 350. Six thousand cubic feet of sal timber were supplied to the Ordnance Department at Rs. 1–2–0 per cubic foot.

* Reserve.	ACS.
Panchabhuti ..	4,320
Buguda	2,542
Gallery	2,575
Chendragiri	2,940

In 1898–99 the Conservator visited the district and wrote a note. Mr. Fischer took charge of the district in August 1898. Mr. Hearsey, Extra Assistant Conservator, was deputed to undertake valuation surveys. This work was taken over by Mr. Cox, Deputy Conservator, in the latter part of June 1899. Unreserved forests were closed to felling of sal by purchasers for eight months of the year pending valuation surveys. Under certain restrictions fellings by purchasers were subsequently allowed in Buguda and Surada ranges and Messrs. Cass & Co. were given the monopoly for one year of extracting sal in the unreserves of Mojjagoda and Kukuluba ranges. 6,990 cubic feet of sal timber were supplied to the Ordnance Department at Rs. 1–2–0 per cubic foot. One hundred and thirty miles of permanent demarcation was done at a cost of Rs. 1,400. In 1899–1900 the concessions granted to darkhastdars for waste land in Ghumsur were modified. The Forest Department were in future to remove valuable timber on lands applied for by Kondhs and Oriyas, only when the darkhastdars were certified to be too poor to pay the value of the trees, while the other darkhastdars were to pay the value of all tree growth. Improvement fellings on a small scale were tried experimentally. The area under fire–protection was 201 square miles. Climber cutting was done over an area of 4,000 acres at a cost of Rs. 250. Four thousand cubic feet of sal were supplied to the Ordnance Department at Rs. 1–2–0 per cubic foot. There was also an experimental supply of 100 *Adina cordifolia* (Holondho) sleepers to the East Coast Railway. Messrs. Cass & Co. who had the monopoly of Mojjagoda and Kukuluba ranges for felling sal in the unreserves, purchased 1,079 trees for Rs. 5,351.

In 1900–01 sleeper operations were suspended. Ninety-one square miles of sal forest in Mojjagoda and Kukuluba ranges were closed to grazing. Two thousand and five hundred acres of climber cutting was carried out in the Brahmanasai reserve and 272 miles of demarcations and clearing effected.

For the first time in the history of the Ghumsur forests systematic fire-protection was introduced and four square miles were successfully protected at a cost of Rs. 64–12–0 per square mile.

During the year owing to the fellings of sleeper timber in Gogodo reserve the question of a final settlement of the Nayagarh and Dasapalla eastern boundaries was raised and referred by the Government of Madras to the Government of Bengal. The extraction of dead wood was begun in all four ranges. In August 1901 a notice was issued in the District Gazette that dead wood might be removed from the reserves at the following rates on permit :—

				RS.	A.	P.
Logs up to	2′	girth each	.. ..	0	4	0
Do.	$2\frac{1}{2}$′	do.	.. ..	0	8	0
Do.	3′	do.	.. ..	1	0	0
Do.	4′	do.	.. ..	2	0	0
Do.	5′	do.	.. ..	2	9	0
Do.	6′	do.	.. ..	3	2	0
Do.	7′	do.	.. ..	3	12	0

The collections up to 31st March 1902 from this source were Rs. 11,113–12–0 for 7,251 logs. This system was put a stop to at the end of March 1902 as the Conservator objected to the want of check. A system by which dead trees were marked and sold standing was then introduced.*

For about 50 years after the Ganjam forests came under administration they were subjected to an intermittent series of exploitation crusades as the demands of the market or the uncontrolled zeal of revenue and departmental officers dictated. A succession of heavy annual fellings aggravated by the importunities of sleeper contractors would be followed by years of inaction during which usually no attempts were made to rectify the previous reckless policy by cultural or protective operations. It has, however, to be borne in mind that during this period the administration was busily engaged in reservation, selection, demarcation, road-making and rest-house construction. During the period a large and illegitimate revenue was obtained from the forests and very little expenditure was incurred on the necessary improvement and protective measures.

The capital was encroached upon and the value of the property has deteriorated. The forests have been managed with an eye to quick financial results and not under sound silvicultural principles. The aim of future administration must therefore be to restore the property to its normal condition and render it capable of a regular and sustained yield. To achieve this end, revenue on a large scale must be foregone for many years to come.

The following figures show the surplus at which the district was run for the ten years (1892–93 to 1901–02) :—

		RS.			RS.
1892–93	+	2,380	1899–1900	+	11,659
1893–94	+	82,810	1900–01	+	12,816
1894–95	+	3,869	1901–02	+	33,691
1895–96	+	8,375			
1896–97	+	3,475	Total ..	+	1,89,386
1897–98	+	8,493			
1898–99	+	21,820			

B.—Period of Messrs. Cox's, Fischer's and Cowley-Brown's Working Plans, 1902 *to* 1915.

In 1902–03, 35 miles of preliminary demarcation was done at a cost of Rs. 410 and 109 miles of permanent demarcation at a cost of Rs. 1,076. The Survey of India Party began the survey of the Ghumsur forests on a 4 inches : 1 mile scale. The working plan drawn out by Mr. S. Cox for the sal areas of the Mojjagoda and Kukuluba ranges was sanctioned and a supplemental working plan thereto was prepared by Mr. C. E. C. Fischer. The total area comprised under these two plans is 351 square miles. $6\frac{1}{2}$ miles of block lines was cut at a cost of Rs. 35 and track to the Gazilbadi rest-house was constructed at a cost of Rs. 50. 93·6 per cent of $62\frac{1}{2}$ square miles under rigid fire-protection was saved.

This was a great advance on anything that had previously been attempted or accomplished. 58,586 cubic feet timber, 6,264 cubic feet fuel and 276,340 bamboos were extracted by Government agency and 215,853 cubic feet timber, 595,612 cubic feet fuel and 1,732,928 bamboos by purchasers while 14,100 cubic feet timber and 90,600 bamboos were given as free grants. The total revenue was Rs. 52,128 while the expenditure was Rs. 44,669 leaving a surplus of Rs. 7,459.

In 1903–04 the Gogodo extension (102 acres) was constituted reserve. Sixty-five miles of preliminary and 35 miles of permanent demarcation was done at a cost of Rs. 308 and Rs. 329 respectively. The Government of India Survey Party continued its work. Mr. Fischer's supplemental working plan was sanctioned and Mr. F. C. L. Cowley Brown was engaged in preparing a working plan for the sal forests of the Surada and Buguda ranges. A combined Range office for Mojjagoda and Kukuluba ranges and a rest-house at Gazilbadi were finished. Thirty-six miles of block line cutting was done at a cost of Rs. 174. 93·8 per cent of $63\frac{1}{2}$ square miles under

* Here Mr. Cox's account stops and Mr. Bennett carries on the history.

rigid fire-protection was not burnt. 17,696 cubic feet of timber, 24,078 cubic feet of fuel and 384,200 bamboos were extracted departmentally and 292,858 cubic feet timber, 455,432 cubic feet fuel and 1,450,657 bamboos by purchasers. An experimental supply of *babuli* grass for paper-making was a failure and resulted in loss. 1,960 cubic feet timber and 10,400 bamboos were removed as free grants.

The total revenue was Rs. 51,270 and expenditure Rs. 47,824 and the net surplus Rs. 3,446. The prescriptions of the working plans for the Mojjagoda and Kukuluba ranges were brought into force.

In 1904–05 the Government of India Survey Party continued its work. No original demarcation was done. The working plan for the Surada and Buguda range forests was sanctioned. Thirty-one miles of block lines were cut at a cost of Rs. 150. Sixty-six square miles were under rigid fire-protection of which 100 per cent is said to have been protected successfully. Light improvement felling extending to about 180 acres were carried out in the Kurcholi B reserve. 15,398 cubic feet timber, 66,525 cubic feet fuel and 470,380 bamboos were extracted departmentally and 447,320 cubic feet of timber, 589, 862 cubic feet fuel and 1,322,380 bamboos by purchasers. 2,300 cubic feet timber and 18,790 bamboos were given as free grants. The revenue in the year was Rs. 66,358 and expenditure Rs. 49,566. The surplus was accordingly Rs. 16,792. Mr. Cox assumed charge of the district from Mr. Fischer in January 1905.

In 1905–06 the Government of India Survey Party continued its work. The construction of a new rest-house at Rambha was completed. There was an exceptionally severe fire season. Mr. Bennett, Assistant Conservator, was on special fire-protection duty and the District Forest Officer and he were in camp in Ghumsur throughout the fire season finding out the real state of matters in order to improve the methods of protection. Ninety per cent of the rigidly protected area was saved and about 50 per cent of that under partial protection. The system of employing the Khond villages in and near reserves on fire-protection in return for concession given to them in the shape of third-class timber and bamboos and thatching grass for repairing their huts, a certain number of trees for ploughs, dead firewood from the reserves and minor produce was started with good results. 10,784 cubic feet of timber, 11,395 cubic feet of fuel and 262,527 bamboos were extracted departmentally and 412,448 cubic feet, 406,193 cubic feet and 1,521,306 respectively by purchasers. 6,585 cubic feet timber and 58,675 bamboos were given as free grants. The revenue amounted to Rs. 56,996 and the expenditure to Rs. 52,414. The surplus was therefore Rs. 4,582. The selection of the pure sal plains forest and its demarcation into separate blocks was begun and much progress made in this direction.

In 1906–07, 38,400 acres of reserved lands in Pondakhol were notified as reserved forest. A rough demarcation of the whole of the Pondakhol outer boundary and of a small portion of the enclosure boundary was done in advance of the Government of India Survey, which continued its work in Ghumsur.

The cost of this demarcation was Rs. 3,647. The first bamboo coupe in Ghumsur was opened in April 1906 at Kalyamba. Much progress was made in the selection and demarcation of the sal areas. As soon as demarcated they were closed to all grazing and were placed under rigid fire-protection. The fire season was a mild one, 61 square miles were under rigid protection and 200 square miles under partial protection. 99·9 per cent of the former and 99·7 per cent of the latter escaped fire. The employment of Khonds in fire-protection was extended. 3,694 cubic feet of timber, 40,647 cubic feet of fuel and 535,998 bamboos were extracted departmentally. 27,829 cubic feet of timber, 425,812 cubic feet of fuel and 913,947 bamboos were removed by purchasers. 240 cubic feet of timber, 425,812 cubic feet of fuel and 913,947 bamboos were removed by purchasers. 240 cubic feet timber and 200 bamboos were given as free grants. The revenue was Rs. 45,681 and the expenditure Rs. 64,193 and the deficit Rs. 18,512. A ghaut road up to the Nuapalli hill in Kriamba reserve was constructed at a cost of Rs. 407.

In 1907–08, 29 miles of outer boundary and 44 miles of enclosure boundary in Pondakhol were roughly demarcated in advance of the Government of India Survey Party. The Government of India Survey Party completed their work in the district. The selection and demarcation of the sal areas was continued. Block line cutting provided in working plan was done.

The first fuel coupe, pure and simple, in Ghumsur was started at Mojjagoda in Bishnuchakram reserve in December 1907. A rest-house with out-houses at Nuapalli in Kriamba reserve was constructed. The fire-season was a severe one. Of 73 square miles under rigid protection 93·98 per cent was saved. About 70 per cent of the 200 square miles under partial protection was not burnt. Of the 307 square miles under no protection practically the whole was burnt. 5,422 cubic feet of timber, 48,357 cubic feet of fuel and 724,520 bamboos were extracted departmentally ; and by purchasers, 367,168 cubic feet of timber, 321,803 cubic feet fuel and 255,001 bamboos, 1,280 cubic feet timber and 6,850 bamboos were given as free grants. The total revenue was Rs. 54,747 and expenditure was Rs. 64,279. The deficit was therefore Rs. 9,532. Mr. Bennett assumed charge of the district from Mr. Cox in July 1907. Mr. McLaughlin was on special fire-protection work in Ghumsur in the hot weather.

In 1908–09 the main provisions of the working plans of the Ghumsur ranges continued to be carried out, except that by general consent the selection fellings provided in Buguda and Surada ranges were deferred and dead sal trees were extracted in these ranges as in Mojjagoda and Kukuluba. The selection and demarcation of the sal areas was completed. Seven miles of block line cutting was done at a cost of Rs. 200. These block lines were made passable to carts. A rest-house was constructed at Rogoda in Surada range. The fire season was a mild one. Of

75 square miles under rigid protection, 99·61 per cent was saved. 97·84 per cent of the 200 square miles under partial protection was not burnt. Most of the 307 square miles under no protection was not burnt. 19,200 cubic feet of timber, 144,279 cubic feet of fuel and 908,461 bamboos were extracted departmentally and 190,762 cubic feet timber, 289,529 cubic feet fuel and 185,201 bamboos by purchasers. 9,445 cubic feet timber and 32,220 bamboos were given as free grants. The revenue was Rs. 52,608 and expenditure Rs. 67,194. The deficit was thus Rs. 14,586.

Government ordered the closure of all reserves to permits, in G.O. No. 2534, Revenue, dated 10th September 1908, and the coupe system to be introduced. Coupes were to supply local wants and not to compete with private forests. In lands outside reserved forests the indent system was sanctioned for the 14 best species of timber trees, viz., Sissua, Piasal, Bheru, Bandhano, Sal, Holondho, Kusumo, Sahajo, Mundi Mundi, Kosi, Soropotri, Mohi, Gangadi Mohi, Orjono and Dhow. These were to be paid for at fixed rates per cubic foot. The seigniorage rates for fuel (dry and green) and bamboos from the unreserves were raised to 8 annas per cart load and 4 pies per head load and Rs. 1–8–0 per cart load and 1 anna 3 pies per head load respectively. Government remarked that "Forest Administration in Ghumsur had been allowed to get into a most inefficient state ; for in order to realize a small revenue the Forest Department has been competing with private owners to the detriment of the forests and selling its produce at unduly low rates. If as stated by the Collector, there are extensive private forests from which supplies are obtainable, the Government forests should have been closed and preserved instead of being denuded for the purposes of competition." Government in G.O. No. 3268, Revenue, dated 2nd December 1908, sanctioned special darkhast rules for the Ghumsur taluk. These provided that the real value of the tree growth on lands darkhasted for should be paid, that the tree growth, except fruit trees should be removed before patta was granted and that the site of the land should be definitely located by a sketch showing the position of the land with reference to other cultivation being attached to each darkhast. The darkhast rules had previously been open to serious abuse. As the value of the tree growth collected was merely nominal, darkhasts were put in in the name of a ryot on behalf of timber dealers.

After the latter had felled as much of the tree growth as he wanted to make his profit, the land was in many cases not cultivated. In other cases patta being granted before the land was cleared the pattadar kept it under forest and issued permits many of which were used to cover theft from Government forests. Moreover the exact site of the land darkhasted for being undefined, unscrupulous darkhastdars changed the site of the land applied for from place to place in a large survey number and cut down and sold the tree growth as they did so. Thus very often 10 times the area applied for was cleared of tree growth. The special darkhast rules also provided that all extension of cultivation should so far as possible be in continuation of existing cultivation and that land containing valuable tree growth should not be broken up when other land suitable for extension of cultivation existed in the village. The closure of reserves to permits necessitated the opening of several fuel and bamboo coupes. As was to be expected in the beginning the sales at these were small.

In 1909–10, May to November, Mr. Whitehead held charge of the district while Mr. Bennett was on six months' leave. A rest-house at Panchabhuti, a rest-house at Bontha and a Range office and quarters for the Range Officer, Surada, were completed. The construction of the following forest earth-roads with gradients not over 1 in 20 was begun ; Russellkonda to Khalagam, Gallery to Ballabadi and Tarasingi to Jadadhora. Three miles of block line cutting in the Ambajora reserve was done at a cost of Rs. 41. The fire season was a severe one. Of 131 square miles under rigid protection, 99·28 per cent was saved. 83·14 per cent of 144 square miles under partial protection was not burnt, about half the area of 307 square miles under no protection was burnt. The area under rigid protection was increased by the cutting of 60 feet wide fire lines between Government reserves and adjoining Zamindari forests. 73,113 cubic feet timber, 272,144 cubic feet fuel and 895,823 bamboos were extracted departmentally and 125,440 cubic feet timber, 47,598 cubic feet fuel and 17,462 bamboos by consumers. 43,853 cubic feet timber and 59,437 bamboos were given as free grants. New Timber Transit Rules for the Ghumsur taluk were sanctioned. The assistance of practically all the Khonds living in or adjacent to the reserves was enlisted in fire and general protection of the forests in return for concessions in the matter of ploughs, firewood and minor produce. The new Pondakhol range was opened in November 1909 and permanent demarcation of the outer and enclosure boundaries was at once taken in hand. The object of this reservation is to protect the head waters of the Rushikulya river by putting a stop to shifting cultivation (podu) by the Khonds on the hill tops and upper slopes and preventing forest fires. This is to be done by providing the Khonds with forest work such as demarcation, road-making and fire-protection, paying them for their labour in kind granting them rewards for successful fire-protection and granting them buffaloes for the better cultivation of permanent cultivation as compensation for the stoppage of podu. Government sanctioned the opening of two more ranges in Ghumsur but it was not possible to constitute them for want of Range Officers. The Gogodo man-eating tiger which is supposed to have killed about 150 persons in two years was shot by a local shikari who received a reward of Rs. 1,000. The Conservator visited the district with a view to improving the finances. He proposed the extraction of large sized dead timber in Gogodo reserve for sale at Berhampur, where fancy prices were expected. Expectations were not realized as the local contractor is not particular about the quality of his timber and will as soon buy a green log as a dead well-searched one. He prefers to buy from a private depot, because there he can get credit. An attempt to get outside contractors to purchase the timber was unsuccessful. The revenue was Rs. 47,421 while expenditure was Rs. 91,609. The deficit was thus Rs. 44,188.

In 1910–11, 83 miles of permanent demarcation was done in Pondakhol at a cost of Rs. 2,774. Government having sanctioned the reservation of the southern part of the Chokkapad khandam to protect part of the head waters of the Mahanadi river, the District Forest Officer selected the proposed reserve, about 70 square miles, and the preliminary demarcation was done. Section 4 notification published for the preliminary demarcation of 4 blocks of forest in Buguda range was also done, the total length of demarcation in both cases being 178½ miles and the cost Rs. 1,630. Cultural operations were attempted experimentally in the Kankar soil. These consisted in bunding the nallas with dams of earth supported by framework of poles and branches interlaced and by introducing seeds, seedlings and root suckers into the bunds and along the nalla silt, the object being to stop the wash-off of loam from the sal areas and to render the Kankar soil fit for growing trees on. Thirty-five acres each in Buguda and Surada ranges were so treated, 60 acres in Mojjagoda range and 43½ acres in Kukuluba range. The total cost was Rs. 1,574 and the result could not be called satisfactory. Rest-houses were constructed at Kaliamba, Gogodo and new Range offices and quarters for the Range Officers at Buguda and Gazilabadi. Further work costing respectively Rs. 802 and Rs. 637 was done on the Russellkonda-Dhowmundia and Gallery-Ballabadi roads, as also on the Osurobondho-Pondakhol boundary road (Surada range) at a cost of Rs. 816 and to Kurcholi-Nuapalli road (Buguda range) at a cost of Rs. 708. On 1st October 1910 two new ranges were constituted, making provision for bringing Chokkapad into the Mojjagoda range and for including all the isolated reserves within the Russellkonda range. The fire season was an average one. The whole of the outer boundaries of Kukuluba, Bontha and Buguda ranges and the great part of those of Surada, Russellkonda and Mojjagoda ranges were converted into 60 feet wide fire lines in order to protect the Government forests from external fires which had previously been the cause of about 50 per cent of the fires in Government forests in Ghumsur. The system proved most efficacious. A larger number of Khonds than in former years in 231 villages undertook to do fire-protection for concessions. The area under special protection was 155 square miles of which 99·6 per cent was not burnt. Ninety-two per cent of the area under ordinary protection was not burnt. No system of fire lines had yet been introduced in Pondakhol but to villages which showed zeal in putting out fires were given rewards of rice. 43,612 cubic feet timber, 322,690 cubic feet fuel and 945,458 bamboos were extracted departmentally and 135,220 cubic feet timber, 117,453 cubic feet fuel and 108,225 bamboos by purchasers. Free grants to the value of Rs. 2,336 were made for rebuilding burnt houses. The revenue was Rs. 61,880 and the expenditure Rs. 1,07,461. The deficit was thus Rs. 45,581. Three elephants were purchsed during the year from the Deputy Commissioner of Angul. The Conservator toured in the Mojjagoda, Kukuluba, Surada and Pondakhol ranges in November and December 1910.

In 1911–12 the Pudrangi enclosure in Chandragiri reserve (72 acres) was constituted reserved forest while about 75 square miles in Chokkapad and four blocks of forest in Buguda range, area about 5 square miles, were notified under section 4. Twenty-eight miles of permanent demarcation of boundaries was done in Pondakhol. Nineteen miles of projected forest roads were aligned, surveyed and levelled in Russellkonda and Pondakhol ranges. Two new firewood coupes at Tangarai and Sondosolia were opened. Fourteen miles of road work was done at a cost of Rs. 8,665. Deputy Ranger's quarters and shops were built in Pondakhol at Gazilbadi, Ramanabadi, Jeracua and Adiponka and rest-sheds at Gombharigudi, Adiponka and Pajibara. The fire season was a comparatively mild one. For the first time the whole of the outer boundaries of the reserves where they adjoined Zamindari and Agency forests were traced to a width of 60 feet. Two hundred and sixty-two square miles of 263 square miles under special protection were not burnt. Ninety-eight per cent of the area not under special protection was not burnt. In Pondakhol no special system of fire-protection was in force but the paths were traced and rewards of rice given to villages which did good work. One hundred and forty-six acres of the broken grounds (kankar) in Mojjagoda, Kukuluba, Bontha, Surada and Buguda ranges were treated culturally as above described and Rs. 590 were spent thereon. The result was not satisfactory as most of the plants died and many of the bunds breached on account of water flow. 69,516 cubic feet of timber, 344,666 cubic feet of fuel and 1,125,444 bamboos were extracted departmentally and 112,353 cubic feet timber, 99,797 cubic feet fuel and 125,940 bamboos by consumers. Free grants to the value of Rs. 1,155 in timber and Rs. 1,170 in bamboos were given for rebuilding burnt villages. The revenue was Rs. 69,394 and expenditure Rs. 1,12,615. The deficit was accordingly Rs. 43,221. The Special Assistant Agent and District Forest Officer inspected the Rambha and Korada Estate forests and recommended Government to order their closure to extraction. The Board and Government did not accept the proposals and the old state of affairs is allowed to continue. The destruction of these forests so far as timber is concerned is proceeding ruthlessly and at the same time the market for Government forest produce is largely affected. Under instructions from the Board practically all departmental working of coupes was given up and working by contract substituted. Ganjam was selected as one of the districts in which the experiment of handing over a block of forest for panchayat management was to be tried. Analysis showed that such a project was not possible.*

1912–13.—Four blocks of forest, Budurangu, Sollundi, Nagari and Chamunda were notified under section 16 (with effect from 1st July 1913). The section 4 outer boundaries of Chokkapad were widened to 30 feet for 20 miles. Final demarcation of Budurangu, Sollundi, Nagari and Chamunda reserves to a distance of 17½ miles was done after a fashion.

A bridle path of about 4 miles from Lodha to Budaguda was aligned at a cost of Rs. 32 ; and a path of 1 mile from Gumbarigudi towards Pajibara for Rs. 4.

* Here Mr. Bennett's account stops and Mr. Minchin carries on the history.

Ten miles of new roads were completed at a cost of Rs. 4,848 in Mojjagoda, Russellkonda, Buguda, Surada and Pondakhol ranges.

At Tarasingi, the headquarters of Bontha and Kukuluba ranges, combined Range office building, separate residences for the two Rangers, and combined quarters for the range clerks and for the peons were constructed.

Also Deputy Ranger's quarters and 'shop' at Pajibara and a rest-house with godowns at Gumbarigudi were constructed; and a new rest-house, in place of a former building destroyed by cyclone, was constructed at Tamana.

The fire season was short and sharp. There was great heat from early March until the middle of May, and no rain fell. The majority of the fires occurred during the latter half of March. Fires were particularly severe in Surada, Pondakhol and Mojjagoda ranges where nearly all the unprotected hill areas were burnt. The fires in Dhumi Dhumi, Vinjagiri and Hukuma reserves were caused by graziers, and double grazing fees for these three reserves for 1913–14 were levied. Of the area of 38,538 acres under general protection, 9·66 per cent was burnt against 2½ per cent in the previous year. Of the unprotected area it is calculated that 8·2 per cent was burnt against 2 per cent in the year 1911–12.

Both in Ghumsur and Pondakhol the Khonds gave assistance in fire-protection and were rewarded with concessions of ploughs and materials for repairing their houses and in Pondakhol villages that had given notable assistance got rewards of rice as well. Concessions to six unsatisfactory villages were cancelled. In Chokkapad difficulty was experienced in getting the Khonds to do root-grubbing, for permanent demarcation of the lines.

40,263 cubic feet of timber, 40,574 cubic feet of fuel and about 600,000 bamboos were extracted departmentally; and 506,270 cubic feet of timber, 426,314 cubic feet of fuel and 490,000 bamboos were extracted by consumers.

For rebuilding the houses destroyed by fire in the fire season, Rs. 514 worth of timber, Rs. 265 worth of bamboos and Rs. 38 worth of grass and fibre were given free.

The revenue was Rs. 66,882, expenditure Rs. 98,198, and the deficit was thus Rs. 31,316.

1913–14.—The forest settlement of the proposed Chokkapad reserve was completed. Permanent demarcation of the outer boundary of the Chokkapad forests from Ghumsur, Rayapada to Mundalisoru for 19 miles and 66 yards was completed at a cost of Rs. 325.

The boundary of Adigudi and Ponkalagam blocks of Pondakhol reserve was revised and notified—*vide* G.O. No. 3230, Revenue, dated 7th November 1913.

Eight miles of new road were constructed in Pondakhol and Kukuluba ranges at a cost of Rs. 4,679. The second bridge over Odangi nalla (Gazilabadi and Adigudi road) was completed at a cost of Rs. 98. Heavy rains did serious damage to bridges during September and October.

In November the District Forest Officer, Mr. H. C. Bennett went on leave and Mr. A. F. Minchin took charge.

The Extra Assistant Conservator's quarters at Russellkonda were completed at a cost of Rs. 2,590. A rest-house with out-houses and stables at Gerada, Rs. 1,270, subordinates' shed at Manitara, Rs. 81, stables and kitchen of Extra Assistant Conservator's bungalow Rs. 277, were completed.

Fire-protection was very successful. Early rains made a great difference but did not save the neighbouring zamindari forests. Except in Buguda range, where several small fires occurred through careless fire-tracing, there were hardly any fires at all.

Considerable progress was made in replacing departmental extraction of produce by contract work; and this is reflected in the following figure, as compared with those of 1912–13, 42,350 cubic feet of timber, 26,577 cubic feet of fuel and 123,048 bamboos were extracted departmentally and 979,993 cubic feet of timber, 588,879 cubic feet of fuel and 613,939 bamboos were extracted by contractors and consumers.

A forest contractor was prosecuted for stealing living sal trees under cover of a contract for the removal of dead timber, and for counterfeiting the ranger's hammer mark and was convicted and sentenced for the former offence.

The Deputy Magistrate of Ghumsur who tried the case was satisfied of the counterfeiting also, but omitted to sentence the person for this separate offence, whereby he escaped punishment altogether. For, the Sessions Judge, on appeal hearing, reversed the conviction for the former offence chiefly because he deemed the contractor too youthful to be accounted responsible for the alleged faults. To get contractors at all, at first considerable leniency has had to be shown and it is gradually being learnt how timber in the forest can be leased without giving loop holes for irregularities by the contractors.

Free grants to the value of 820 for timber, 239 for bamboos and 9 for fibre and grass were given for the rebuilding of houses destroyed by fire.

The revenue was Rs. 97,761, expenditure Rs. 92,512. There was thus a surplus of Rs. 5,249.

1914–15.—Draft notification under section 16 for Chokkapad forests was submitted to the Board.

During the year Adigudi and Ponkalagam blocks in Pondakhol range were demarcated according to a revised notification sanctioned by Government in G.O. No. 3230, Revenue, dated 7th November 1913.

Four miles of new roads were constructed in Pondakhol and Surada ranges at a cost of Rs. 3,527. The following buildings were completed during the year :—

	RS.
1. Construction of a rest-house with out-houses at Chahali at a cost of	680
2. Construction of office godowns in the Extra Assistant Conservator's compound at a cost of	615
3. Construction of a kitchen and stables in Surada and Pondakhol ranges at a cost of	258 & 287
4. Construction of a kitchen in Buguda Range Office compound at a cost of.	143
5. Improvement to Minajadi rest-house at a cost of	307
A well was constructed in the Extra Assistant Conservator's bungalow compound at a cost of	315

The fire season this year was an exceptionally difficult one as there were no rains at all till the middle of May 1915. (Usually there are occasional heavy thunder showers from the end of March onwards which bring out new grass and end the dangerous state of things.)

In the rigidly protected forests 129 acres were burnt. One thousand and forty-four acres were burnt in the partially protected area of 38,538 acres in Pondakhol range.

The fire-protection work was therefore successful considering the conditions. Most of the fires were due to carelessness on the part of Khonds and others who travel through the forests at night carrying torches leaving glowing ashes here and there. Departmental extraction of forest produce was replaced largely by a contract system.

56,449 cubic feet of timber, 10,980 cubic feet of fuel and 9,820 bamboos were extracted departmentally and 385,916 cubic feet of timber, 851,673 cubic feet of fuel and 655,173 bamboos were extracted from forests by contractors or consumers.

Free grants were given to the value of Rs. 3,034 for the rebuilding of houses destroyed by fire.

The revenue was Rs. 1,02,871, expenditure Rs. 93,215 (Surplus Rs. 9,656).

C.—Period of Mr. Minchin's Interim Working Plan, 1915—1919.

1915–16. Eight reserves.—Agastinowgam and its extensions, Chatrapur 1 A and B, and II Palur, Rampalli B, Mohogora, Runkuhanumantapuram, Bodachendana and Panchabhuti A (Panchakondia) having an area of 10 squares miles were disafforested during the year. Incorporation in Kriamba Reserve of survey fields Nos. 30 A and B, 31, 32 and 34 comprising an area of 8·28 acres was notified under section 4 of the Forest Act.

Draft notification of the Chokkapad forests under section 16 of the Forest Act was submitted to the Board of Revenue in May 1916 in final form.

Osurobandho-Pondakhol boundary road was completed and the Tarasingi-Kukuluba road was extended by six furlongs.

The following buildings were completed during the year :—Subordinates' sheds at Purnapani, Hattiguda, Kullada, Kesarapalli, and huts for forester and forest guards at Jogidi ; Deputy Ranger's quarters at Chahali ; wooden rest-house at Osurobandho.

The fire season this year was a difficult one. Out of 86,077 acres under rigid protection 846 acres were burnt. Seventeen thousand two hundred and seventy-five acres mostly in Mojjagoda and Russellkonda ranges were burnt out of the 172,158 acres under partial protection and about 768 acres were burnt out of 86,391 acres of unprotected forests. 96,456 cubic feet of timber, 24,420 cubic feet of fuel and 1,065 bamboos were extracted departmentally and 308,722 cubic feet of timber, 503,654 cubic feet of fuel and 6,31,480 bamboos were extracted by contractors and consumers. Free grants of small timber, etc., to the value of Rs. 612 were given to the villagers for rebuilding their houses destroyed by fire.

The revenue was Rs. 66,415 and expenditure Rs. 90,754. Deficit Rs. 24,339. Owing to war conditions, contractors were not able to raise money readily ; sale results from timber and coupes were at a low level. In progress with working plans and in organization generally it was a satisfactory year. For the first time the whole district came under interim working plans.

The Conservator of Forests, Northern Circle, visited parts of Russellkonda, Mojjagoda and Buguda ranges, with the object of obtaining data for arriving at the general principles on which the future working of the sal forests should be based.

During the year, the Forest Member, Mr. H. F. W. Gillman, toured in the Russellkonda, Mojjagoda, Kukuluba ranges. It was decided that the Inspector-General of Forests should be asked to advise us as to the system on which future working plans were to be based.

1916–17.—Kriamba enclosure comprising survey fields Nos. 30-A and B, 21, 32 and 34 measuring 8·28 acres was notified under section 16 of the Forest Act and added to the Kriamba reserve. Preliminary steps were taken towards reservation of a deserted enclosure within Ambazoro reserve and of forest lands surrounding Russellkonda reservoir. The latter to be reserved at the request of the Public Works Department.

Roads and bridges constructed during the year were :—

1. First four furlongs of mile 7 of Gazilbadi-Adigudi road.

2. Second four furlongs of mile 4 and seventh and eighth furlongs ot mile 3 of Pondakhol boundary-Adigudi road.

3. First four furlongs of mile 5 of Adigudi-Adiponka road.

4. Third bridge across Odangi Nalla.

A bridge across the Rushikulya river at Pippalaponka was completed during the year. In 1914 the Forest Department was asked by the Agent to build a bridge (with Agency funds) as there are Forest staff on the spot and as the reserves can be drawn upon for materials. Also because the Forest staff were then the persons most interested in the speedy completion of the bridge. Mr. G. Leonard, D.B.E. prepared the design and estimate, adopting the forest rates. The estimate was for Rs. 5,000 and some minor alterations in design added Rs. 650 to the original figure. The bridge was completed in March 1917.

A suspension bridge over Odangi Nala was constructed with Shiali fibre ropes at a cost of Rs. 10.

Russellkonda Range Officer's quarters were under construction during the year. A tana shed at Bamsolundi was constructed at a cost of Rs. 25. A well was constructed in the compound of Gogodo rest-house at a cost of Rs. 166.

The fire season this year was a mild one and the results of protection operations were very successful. Good showers in February and March helped to some extent. Fire tracing operations were commenced at the beginning of November rather earlier than usual. Another change in the year's procedure was the clearing of the entire width of the fire-lines. Hitherto only guide lines on either side of the lines had been cleared and we have had to wait often for a long time until the growth in the centre was dry, before burning could be accomplished properly. The new system helped to prevent accidental fires during the burning of the lines ; and also gave clean well-burnt fire-lines. The Extra Assistant Conservator undertook experiments to find out the actual cost of clearing and burning fire-lines containing typical growth. The data obtained were used in fixing the rates for operations in 1917–18.

15,068 cubic feet of timber (chiefly from unreserves) were extracted departmentally. 134,000 cubic feet of timber, 242,000 cubic feet of fuel and 672,936 bamboos were extracted by contractors and consumers.

Free grants of timber, etc., to the value of Rs. 1,013 were given to villagers to enable them to rebuild houses destroyed by fire. Timber, firewood, limestone, rough stone and metal were granted for utilization in connexion with the construction of the Agency bridge over Rushikulya.

The revenue of the district was Rs. 51,239 and expenditure Rs. 80,568, deficit Rs. 29,329. The system of protection was formulated as follows :—

Each range is subdivided into sections. One section is managed by the Range officer and the others by the one or more foresters, attached to the range. Within the section there are several 'beats' and a single guard, or a guard assisted by a watcher, is responsible for the protection of his beat. The section officers are held responsible for protection in their sections ; and can, when they wish to, collect the forest guards and use them as a gang. (In this manner climber cutting has been done as well as beat protection.)

In the Berhampur range during the autumn of 1916 a man-eating tiger took up its abode and dislocated the business of the fuel and bamboo coupe contractors. In Ghumsur there were three man-eaters at work.

1917–18.—Notifications under section 4 of the Forest Act for reservation of a deserted enclosure in the Ambazora reserve and for reservation of forest lands surrounding Russellkonda reservoir were prepared during the year.

The following road-works were executed during the year :—

1. Second four furlongs of mile 7 of Gazilbadi-Adigudi road.

2. First four furlongs of mile 5 and 118 feet of mile 4 of Pondakhol boundary-Adigudi road.

3. Fourth mile of Adigudi-Adiponka road and the fifth and part of the sixth furlongs of mile 5.

Three jungle fibre suspension bridges were constructed at a cost of Rs. 22 for connecting Adiponka with Gazilbadi. They were a success and were much appreciated by the Khonds. Unfortunately a record flood washed one of these bridges away and the following day the range peon, endeavouring to swim the stream, was drowned.

Construction of quarters for the Range Officer, Russellkonda, commenced in the previous year was almost complete at the end of the year. Rupees 643 was spent on it during the year. Construction of a well at Chahali and renewal of the old well in the Russellkonda rest-house compound were taken up.

The fire season up to the end of March was hot and dry but protection was very successful. In early April there were the customary thunder showers which lessened the danger of fires ; and the monsoon itself broke early in May.

In Rambha and Baiballi reserves 9,188 cubic feet of timber were felled for supply of sleepers to the Munitions Board, as an emergency measure. Arrangements for the sawing of sleepers were in the hands of Ranger J. A. P. D. Cruz.

19,000 cubic feet of timber, 15,000 cubic feet of fuel, 12,070 bamboos were extracted departmentally.

251,000 cubic feet of timber, 522,000 cubic feet of fuel and 1,407,081 bamboos were removed by contractors and consumers.

Free grants of timber, etc., to the value of Rs. 297 were given to villagers for rebuilding houses destroyed by fire.

The revenue was Rs. 80,448 and the expenditure Rs. 87,768, deficit Rs. 7,320.

In Kriamba reserve 8 acres of land was lent in June 1918 to a small community of Khonds of Talasoro, an enclosure village. The agreement with them was that they should clear the tree growth (bamboo and non-sal species of no value), grow dry field crops so long as is desirable and tend red sander plants, etc., which were given to them to plant out in lines 10 feet apart.

The question of introducing a forest panchayat system for certain suitable reserves was considered :—No Panchayats were actually formed as the villagers were not sufficiently ‘ advanced ’ to manage reserves for themselves in the manner recommended by the Forest Committee. A determined attempt to initiate the system in Sondasolia reserve was made by the Collector and the District Forest Officer. It seemed, however, that the inhabitants of the neighbouring villages regarded the scheme with complete indifference and apathy. The people were not oblivious to the advantages of maintaining forest on the hill sides but had no desire for responsibility.

Mr. M. E. Couchman visited the sal forests of Ganjam with a view to examining a proposal to open a sawmill.

Mr. J. Brookes of Messrs. Parry and Company was deputed by Government to investigate the possibility of erecting a sawmill at Russellkonda.

The Conservator, Northern Circle, visited the forests during the year.

1918–19.—Important chiefly because the 1918 crops failed almost completely and famine commenced towards the close of 1918.

The following blocks were notified under section 4 of the Forest Act.

		ACS.
1.	Block 1, part of Gallery extension No. 1	36·50
2.	Block 2 do.	107·50
3.	Block 3 do.	19·00
4.	Block 4 do.	678·50
5.	Block 5, Kullada extension No. 1	438·50
6.	Ambazora extension No. 1	103·70
7.	Chandragiri extension (Kuntinokuppa Bit A/2)	67·90
8.	Extension of Pippalaponka reserve	9·20

An area of 31 acres of Ramaguda reserve was disafforested in order to improve the boundary. The Settlement of Ambazora extension No. 1 of 103·70 acres was completed by the Forest Settlement Officer.

The future of the unreserves was given special attention. Owing to their shape, situation, the profuse nature of the tree-growth, it has been found in practice most difficult to protect the unreserves unless large special staff were to be engaged for the purpose. It was therefore decided by the Collector and the District Forest Officer that throughout the unreserves marketable trees should as far as possible be extracted by the Forest Department ; that steps should be taken to bring under reservation the more valuable and conveniently situated unreserve sal areas ; and that in the remainder everything possible should be done to get land that is wanted for purposes of cultivation cleared of its tree–growth and handed over on patta. Government collecting of course the value of tree-growth. (In the case of Khond village communities that require land the District Forest Officer uses his discretion as to the terms on which tree-growth is given.) The selection of sal areas for reservation was commenced. In third quality sal coupes demarcation stones with inscriptions were planted at the corners of the several coupes at a cost of Rs. 578.

The following roads and bridges were constructed during the year :—

1. Second 4 furlongs of mile 5 of Agency boundary, Adigudi road.
2. One hundred and six feet of mile 4 of Agency boundary, Adigudi road.
3. Gazilabadi-Adigudi road 1 mile and 132 feet (the road was completed).
4. Adigudi-Adiponka road 6 furlongs (the road was completed).
5. Tarasingi-Gayagonda road 2 furlongs, 6 chains.
6. Three roads in Buguda range-Korcholi to Manitara, Talasaro to Ratnadevi and Nuapalli to Kriamba. (These were started as famine relief works and Rs. 506 was spent.)
7. Wooden culvert on the third mile of Osurobandho-Minajodi road.
8. Two Irish bridges on the Tarasingi-Kukuluba road.

The following building works were undertaken during the year :—

1. Kitchen for Kukuluba Range Officer's quarters.
2. Do. Bontha do.
3. Do. Russellkonda. do.
4. Deputy Rangers quarters at Osorobandho.

Russellkonda Range Officer's quarters were completed.

Well at Chahali and reconstruction of the well in the compound of the rest-house at Russellkonda were completed during the year at a cost of Rs. 46 and Rs. 106 respectively.

The fire season was very hot and was rainless practically until May and some serious fires occurred Owing to famine conditions the reserves were constantly full of Khonds and poor Oriyas seeking honey, jungle fruits, roots and sago. No attempt was made to restrict the people to unprotected forests ; and they were encouraged to cut sago palms, etc. The forests were therefore exposed to danger form fire.

The Interim Working Plan provided for extraction of sal, etc., timber from unreserves of the seven Ghumsur ranges according to a programme. Trees 4 feet 6 inches in girth and upwards were felled departmentally and were converted into sleepers and scantlings for supply to the Munitions Board, to Messrs. Bird & Co., and to the Public Works Department in Vizagapatam for construction of a new hospital. Two hundred trees from Galleri and Dharpangia reserves ; 11 trees in Rayagocha beat of Chendragiri reserve ; 208 trees from Brahmansayi hill forests and 115 trees from Kriamba D block were felled for sleepers. In this respect the provisions of the interim Working Plan were exceeded. Instructions had been received from the Inspector-General to cut railway sleepers urgently in spite of working plans owing to the exigencies of the war. Timber of unreserves proved to be unsuitable for sleeper operations and the additional fellings in reserves were necessitated to enable us to fulfil our promises in the way of sleepers. The timber felled in the above reserves was selected from scattered patches of good growth, not included in the plains sal blocks, for which a working plan was under preparation. 88,000 cubic feet of timber, 362,000 cubic feet fuel, 29,840 bamboos were extracted departmentally, 158,000 cubic feet of timber, 362,000 cubic feet of fuel and 881,162 bamboos were removed by contractors and consumers.

Free grants of timber to the value of Rs. 664 were given to the villagers.

The revenue was Rs. 91,229 and the expenditure Rs. 1,33,514, deficit Rs. 42,285.

The Inspector-General of Forests inspected the Ganjam Sal Forest and discussed with Conservator, Northern circle, and the District Forest Officer the draft Working Plan prepared by the latter.

As a famine measure the unreserves were opened to free removals of material under 2 feet in girth in the case of reserved and classified trees.

The following small non-sal coupes were opened in the reserves of Russellkonda range for free removal of fuel, etc., in connection with famine relief arrangements :—

1. Malati reserve, 25 acres.
2. Vishnuchakram reserve, Kumarasuni, 22 acres.
3. Vishnuchakram reserve, Tangarai block, 25 acres.
4. Sondosolia reserve, 23 acres.
5. Sondosolia reserve, 25 acres.

The coupes are situated in localities where there are no unreserves.

These famine measures made a considerable difference to amounts realized by sales of fuel coupes, and the year's deficit was a large one.

D.—Period of Mr. Minchin's Working Plan, 1919–20 *to* 1929–30.

1919–20.—Special features of the year were (*a*) famine operations in the district and particularly in Ghumsur taluk until matters improved in October and November 1919.

(*b*) Completion of our commitments in the way of supplies of railway sleepers to the Munitions Board and to Messrs. Bird and Company of Calcutta. These were very difficult matters owing to the effect of famine upon our 130 and odd pairs of sawyers ; many of them bolted to Rangoon, etc., with money advanced to them ; several died and there was a long-drawn-out battle endeavouring to keep those that were still in Ghumsur at work and thereby get back our advances which were heavy.

(*c*) In March 1920 the whole of the Ghumsur Working Plan was completed and sent to the press. For the Plains Sal Timber Working Circle the prescriptions of the plan (though not yet sanctioned formally) were treated as approved and the operations prescribed were commenced. Similarly in the Plains Sal Pole Working Circle, Lower Hill Fuel and Scrub Jungle Fuel Working Circles and in the Bamboo Working Circle the prescriptions of the plan were followed, but in these cases there was no startling departure from the previous practice.

Reservation.—During the year the following blocks were notified under section 16 of the Madras Forest Act :—

1. Ambazora extension No. 1 of 103·7 acres (Gopodaro enclosure).
2. Pippalaponka extension of 9·6 acres (Nondapodaro enclosure).

Steps were taken to bring under reservation the more valuable and conveniently situated unreserve sal areas in Ghumsur. The Extra Assistant Conservator of Forests (Mr. Said-ud-Uddin Ahmed) completed the preliminary selection of the areas for reservation in Mojjagoda, Kukuluba and Bontha ranges.

Roads and bridges.—The following roads and bridges were constructed during the year :—

1. First 4 furlongs of mile 6 of Pondakhol boundary-Adigudi road. This completed the whole of Pondakhol road system.

2. First mile of each of the three earth roads in Buguda range, viz., Kurcholi-Manitara road, Talasoro-Ratnadevi road and Nuapalli-Kriamba road.

3. Kukuluba-Gayagonda road, 2 miles 6 chains.
4. Second wooden culvert on the third mile of Osurobandho-Minadjadi road.

Buildings and wells.—The following building works were undertaken :—

1. Mojjagoda Range Officer's quarters at Russellkonda.
2. Combined stables for Russellkonda and Mojjagoda Range Officers at Russellkor
3. Kitchen for Mojjagoda Range Officer's quarters at Russellkonda.
4. Subordinates' sheds at Baiballi and Potharapalli.
5. Latrine for Russellkonda Range Officer at Russellkonda.
6. Completion of kitchen for Kukuluba Range Officer at Tarasingi.
7. Completion of kitchen for Bontha Range Officer at Tarasingi.
8. Combined stables for Kukuluba and Bontha Range Officers at Tarasingi.
9. Forest Guard's sheds at Bontha and Surumoni.
10. Rest-house at Kulapani in Buguda range.
11. Tana sheds at Golia and Takkarada.
12. Construction of rest-house at Budaguda in Pondakhol range commenced.
13. Completion of Forester's quarters at Osurobandho.
14. Well at Budaguda was completed at a cost of Rs. 240.
15. Construction of a well for Kaliamba bungalow was in progress.

Fire season.—The fire season of 1920 is described under the following year 1920–21.

Exploitation.—101,000 cubic feet of timber, 37,000 cubic feet of fuel and 4,650 bamboos were extracted departmentally. 263,000 cubic feet of timber, 429,000 cubic feet of fuel and 518,047 bamboos were removed by contractors and consumers.

Free grants.—Of timber to the value of Rs. 1,160 were given to villagers for rebuilding the houses destroyed by fire.

The revenue was Rs. 1,25,711 and the expenditure Rs. 1,44,423, deficit Rs. 18,712.

The experiment of the *taungya* plantation was continued in the same area in Talasoro in Kriamba reserve given to the Khonds. The experiment was not successful. The Khonds were careless over their ploughing and damaged the established plants. They were also reported to be regarding the system with indifference.

The Divisional Forest Officer, Puri (Orissa) visited the forests in May with a view to studying methods of regeneration adopted in this district.

The five small non-sal coupes opened last year in Russellkonda range for free removal of fuel, etc., were closed in December when famine conditions had improved.

The year was important chiefly because of the introduction of Mr. Minchin's Working Plan for the Ghumsur forests.

1920–21.—Mr. Minchin's Working Plan was still in the press but its prescriptions were carried out during the year.

Russellkonda Saw Mill.—During this year the construction of the Russellkonda Saw Mill was started. Captain Harloe Irwin, Forest Utilization Officer, was responsible for the building work and under him were Ranger Ramunni Menon and other subordinates on special duty. For the buildings alone apart from the machinery, Rs. 99,581 were sanctioned. Of this Rs. 51,322 were spent during the year. An amount of Rs. 2,16,000 was provided for machinery and cost of its transport. For the purchase and erection of the machinery Messrs. Parry and Company were responsible under a contract with Government. Their Saw Mill Expert Mr. Brace Brookes visited Europe and America during the year and studied the latest Saw Mill methods.

Reservation.—Two square miles were notified under section 16 of the Forest Act while 0·1 square mile remained under settlement. The demarcation of Blocks 1 to 4 of Gallery Extension I was commenced and a total length of 2 miles 2 furlongs was cut 30 feet wide at a cost of Rs. 16–4–0.

Roads and bridges.—The following roads and bridges were constructed :—

1. Ballinkia rest-house road, 1 furlong 1 chain.
2. Portion of Budili-Ballabadi road, 1 mile.
3. Kukuluba-Gayagonda road, 2 miles 6 furlongs (the road was completed).
4. Kondrai-Koradabadi road, 2 miles 2 furlongs.
5. First bridge over Odanginalo.

Buildings and wells.—The following buildings were constructed :—

1. Mojjagoda Range Officer's quarters and kitchen at Russellkonda.
2. Rest-house at Kulapani ; stables and out-houses.
3. Rest house at Gayagonda.
4. Budaguda rest-house.
5. Inspection bungalow at Balinkia.
6. Saw Mill buildings at Russellkonda.
7. Well at Kaliamba bungalow was completed.
8. Two wells, one for the Mill Superintendent's bungalow and the other for the Saw Mill were undertaken.

Rapid progress was made in the construction of the Saw Mill. In order to utilize the full labour supply, work on all buildings was carried on simultaneously. No building was entirely completed in the year.

Fire season.—The fire season of 1920 threatened to be very severe but luckily we had a few early showers which did much in reducing the danger. There were 23 fires which burnt an area of 1,218 acres. In the rigidly protected area, 5 fires burnt 386 acres. Of this, 265 acres refer to one fire in Baiballi reserve which was attributed to intentional firing with a view to scare away wild animals. Two fires accounted for 61 acres in Bontha range ; the fires were supposed to be the outcome of malice. 35 acres were burnt in Dumu Dumi reserve, a coppice coupe area. In the partially protected area, 11 fires burnt 707 acres. In the unprotected area, 7 fires burnt 125 acres. Khonds of all villages helped to protect the forests from fire. Other villages except Tilisingi and Kuradia turned out to extinguish the fire without much protest. The results of fire-protection were very satisfactory.

Exploitation.—335,000 cubic feet of timber, 203,000 cubic feet of fuel were extracted departmentally. 129,000 cubic feet of timber, 396,000 cubic feet of fuel were removed by contractors and consumers.

Free grants to the value of Rs. 424 were made to the villagers for rebuilding the houses destroyed by fire.

The revenue was Rs. 82,137 and the expenditure Rs. 2,17,265, deficit Rs. 1,35,128. The large deficit was due to the exploitation of timber for the saw mill and to the construction of the mill buildings.

Mr. S. Cox, the Chief Conservator of Forests, visited the district in December 1920 and inspected some of the saw mill buildings and working plan areas.

The Vernacular Training School for Forest Guards was held in Ghumsur for the fourth time from 6th January 1921.

1921–22.—Mr. A. F. Minchin's Working Plan for the Ghumsur forests was sanctioned in Chief Conservator's Proceedings No. 56, dated 17th December 1921. But as has already been stated its prescriptions began to be applied from 1st April 1919.

Russellkonda Saw Mill.—The outstanding event of the year was the completion of the Russellkonda Saw Mill which sawed its first log on 20th February 1922. No regular sawing for the market was done up to the end of March 1922 but all the machines were given a trial and a good deal of planking for the flooring of shafts and engine room was sawn up. During a good many months of the year Captain Irwin was at Russellkonda seeing to the construction of the buildings. He also brought the 18-ton boiler from Berhampur by means of coolies. This took about six weeks. On the day the boiler arrived at Russellkonda, no less than 400 coolies were engaged in dragging it. A band headed the procession and Captain Irwin was garlanded on arrival at the Mill. Mr. Brace Brookes and Mr. Templeman installed the machinery and the latter remained as the Saw Mill Superintendent. At the end of February 1922, Mr. S. Cox the Chief Conservator, Mr. H. C. Bennett the Conservator, Mr. Wimbush the District Forest Officer, Captain Irwin the Utilization Officer, had a meeting at Russellkonda with Mr. Wood, partner in Parry and Company, Mr. Bruce Brookes and Mr. Templeman with a view to settling various matters connected with the inauguration of the concern. The final figures of the completion report prepared for the information of the Government were—Saw Mill Buildings Rs. 1,07,773–9–4.

The total quantity of timber put into the Saw Mill depot up to 31st March 1922 was 32,920 logs of 363,302 cubic feet. This is about double the quantity that was in the depot at the end of March 1921. This included some timber from wind fallen trees and other sources, outside the provisions of the working plan.

Reservation.—Dhowgam enclosure 0·07 square mile was reserved. Portions of Galleri, Tiliki, Vishnuchakram and Chandragiri reserves comprising 0·37 square mile were disreserved. 0·107 square mile of Chandragiri extension (Kutni kuppa A-2) was actually settled but the reservation took effect from May 1922.

Roads. The following roads were constructed :—

1. Balinkia rest-house road, 7 furlongs.
2. Portion of Budili-Ballabadi road, 2 furlongs.
3. Kulapani-Koradabadi road, 1 mile.

Buildings.—The following buildings were constructed :—

1. Balinkia rest-house.
2. Motor shed at Russellkonda.
3. Stables and out-houses at Kulapani.
4. Saw Mill buildings were completed.
5. Well at Balinkia.

The circuit house, Russellkonda, was fully furnished with beds, crockery, etc., at a cost of Rs. 1,200 and a butler on Rs. 15 per month was appointed.

Fire season.—The fire season of 1921 was a disastrous one. There were 145 fires which burnt 112,571 acres, in spite of very satisfactory fire-protection works. The chief reason for this was the entire failure of the monthly showers. Also the cessation of rains in the previous year resulted in the existence of unusually dry conditions in the forest. The increased severity of the wind also played an important part. Mojjagoda range suffered most. Extensive areas of Rambha, Dharpangia, Dhimirijoli and Chokkapad reserves were burnt. In the rigidly protected area 23 fires occurred

and burnt an area of 3,082 acres. In the partially protected area 74 fires burnt an area of 61,462 acres. In the unprotected area 48 fires burnt an area of 48,027 acres. An innovation was made by circulating notices about fire-protection throughout the villages before the fire season began.

The department continued to be on good terms with the Khonds. It was found that in recent years the Khonds had begun to look upon the concessions as rights. Instead of allowing unlimited free grazing orders were issued that no individual be allowed to graze more than 6 cattle free of charge. This order and the consequent explanation of the position had a salutary effect.

Exploitation.—196,000 cubic feet of timber, 137,000 cubic feet of fuel were extracted departmentally. 145,000 cubic feet of timber, 361,000 cubic feet of fuel were removed by purchasers.

Free grants to the value of Rs. 3,488 were given during the year.

The revenue was Rs. 68,323 and the expenditure Rs. 2,98,096, deficit Rs. 2,29,773. The large deficit was due to the exploitations of timber for the Saw Mill and to the completion of the Saw Mill buildings.

Mr. S. Cox, the Chief Conservator, visited the district in July 1921 and inspected certain working plan areas. The Conservator, I Circle, visited the district in January 1922.

The Vernacular Training School was held in Ghumsur for the fifth time from 6th January 1922.

1922–23.—*Russellkonda Saw Mill.*—The saw mill commenced regular working in April 1922 under Mr. C. J. Templeman, Parry and Company's agent. Various difficulties presented themselves the main ones being (1) A large percentage of logs already in the depot were found unprofitable for milling purposes owing to rot, crookedness and smallness. (2) The inability of the country carts to bring in logs of large sizes most suitable to the mill. (3) The lack of a depot and shed at Berhampur to facilitate the despatch of sawn timber to Calcutta and elsewhere. A meeting of the Board of Control was held at Russellkonda on 27th July 1922 with Mr. S. Cox, the Chief Conservator, Mr. Martin, the Forest Engineer, Mr. D. T. Barry, the Conservator, Mr. A. Wimbush, the District Forest Officer, and Mr. Templeman, the Mill Superintendent. It was decided that Mr. Templeman (the Mill Superintendent) should be allowed to reject such logs of the existing stock as were unfit for milling. With regard to future supplies a specification for mill logs was issued to all Range Officers early in September. It was decided that a new type of cart was needed and the District Forest Officer was requested to enquire into the matter. A small timber storage shed 50′ × 28′ was built at a cost of Rs. 1,977 on the railway premises at Berhampur and handed over to the mill management. This was found to be inadequate and sanction was obtained to build one 60′ × 80′ on a better site.

The mill soon decided to cut only sal, *Pterocarpus marsupium* and *Terminalia tomentosa* and found that even the last two species sold only slowly.

90,817 cubic feet of logs extracted from the forests were brought into the exploitation depot of Russellkonda during the year. 66,888 cubic feet of rejected logs were sold from the Exploitation depot for Rs. 25,084.

Reservation.—The question of reserving 120 acres was investigated by the District Forest Officer and it was decided not to reserve it.

Roads.—Balinkia rest-house road 7 furlongs was completed.

Buildings.—The following building works were completed during the year :—

1. Balinkia rest-house.
2. Tarasingi rest-house.
3. Timber storage shed at Berhampur.
4. Barbed wire fencing around Saw Mill Agent's bungalow and clerks' quarters.

Fire season.—The fire season of 1922 was decidedly a more favourable one than that of the previous year. There were 86 fires which burnt an area of 38.296 acres. It was regrettable that more rigidly protected area was burnt in 1922 than in 1921. This was because Mojjagoda range was badly protected and 2,804 acres of rigidly protected area were burnt. One case of incendiarism by six persons was detected. They were prosecuted and sentenced to 3 months' rigorous imprisonment and Rs. 50 fine. In the rigidly protected area 29 fires burnt 3,747 acres. In the partially protected area, 30 fires burnt 19,580 acres and in the unprotected area 27 fires burnt 14,670 acres. Notifications in the District Gazette did not seem to create any interest in the villagers regarding the protection of the forests against fire.

Exploitation.—101,000 cubic feet of timber and 6,000 cubic feet of fuel were extracted departmentally. 108,000 cubic feet of timber and 453,000 cubic feet of fuel were removed by purchasers and consumers.

Free grants.—The value of free grants given during the year was Rs. 653.

The revenue was Rs. 93,896 and the expenditure Rs. 172,350, deficit Rs. 81,454. The cost of 141,378 cubic feet of logs supplied to the saw mill up to the end of this year amounting to Rs. 35,344 at 4 annas per cubic foot had not been adjusted in the Accountant-General's Office. When this was made the net deficit would be Rs. 46,110.

The Chief Conservator of Forests and the Conservator, I Circle, visited the district in July 1922 and November 1922 and inspected the saw mill, exploitation depot, etc.

His Excellency Lord Willingdon, the Governor of Madras, and Lady Willingdon visited Russellkonda on 28th November 1922 and inspected the saw mill and reservoir. They also motored to the Suradevi improvement felling coupes and sample plots.

The Vernacular Training School was held in Ghumsur for the sixth time from 6th January 1923.

1923–24—*Russellkonda Saw Mill.*—The saw mill continued to claim much attention by the District Forest Officer. In February 1923 the saw mill well gave signs of failing and in March it was necessary to obtain Public Works Department's sanction to draw water from the reservoir through an open channel to fill up the well. This was done three times. In April a large new well was started. A new timber shed 80′ × 60′ was built at Berhampur station for the Mill at a cost of Rs. 7,920. A Leyland lorry and trailer to carry 4 tons was bought at a cost of Rs. 17,648 to carry sawn timber to Berhampur. A lorry shed was built at Russellkonda to house two such combinations at a cost of Rs. 1,272. A Ford motor car was bought for the Superintendent at a cost of Rs. 2,904.

126,743 cubic feet of logs of sal, *Pterocarpus marsupium* and *Terminalia tomentosa* extracted from the forests were brought into the exploitation depot at Russellkonda. 69,251 cubic feet of rejected timber were sold from the depot for Rs. 17,415. The depots which stretched for over a mile early in 1923 were much reduced. All the 1923–24 timber was put in the barbed wire depot and from thence a tramway to the mill was laid by the Superintendent at a cost of about Rs. 4,000. The Superintendent then took charge of the depot on 1st February 1924 leaving the old stock and species other than sal and *Pterocarpus marsupium* in the 1923–24 stocks in charge of the Exploitation Ranger.

Formerly trees were converted into logs chiefly to suit the carts. During the year, trees were logged to obtain the longest, straight and sound lengths for the mill and it was found possible to get them carted. As many as 200 carts per day were known to arrive at Russellkonda in January to March 1924.

Reservation.—A portion of Kaliamba reserve 6 acres was disreserved for the construction of an irrigation tank.

Bridges.—The following bridges were constructed :—

(1) Three culverts on Tilisingi-Tarasingi road were started in the year.

(2) A bridge across Odangi nalo near Gumbhariguda rest-house was completed at a cost of Rs. 350.

3. *Buildings.*—The following buildings were under construction or completed during the year :—

(1) Rest-house out-houses and stables at Balinkia.

(2) Rest-house out-houses and stables at Tarasingi.

(3) Barbed wire fencing around circuit house at Russellkonda.

Fire season.—The fire season of 1923 was a more favourable one than those of the preceding two years. There were unusual rains in February, April and May which helped considerably in reducing the incidence of forest fires. A distressing feature was the burning of the Ravine I of 1920–21 in the Rambha reserve of 131 acres and 20 acres in Plains Sal Timber Coupe II of 1920–21 in Chandragiri reserve. Two cases of incendiarism were detected. The accused were prosecuted and sentenced to three months' rigorous imprisonment in each case. In the rigidly protected area seven fires burnt 802 acres. In the partially protected area 22 fires burnt 6,429 acres and in the unprotected area 19 fires burnt 5,022 acres. In Kukuluba range nearly 40 miles of fire lines could not be burnt on account of man-eating tigers.

288,000 cubic feet of timber and 311,000 cubic feet of fuel were extracted departmentally. 201,000 cubic feet of timber and 568,000 cubic feet of fuel were removed by purchasers.

Free grants.—The value of free grants given during the year was Rs. 1,534.

The revenue for the year was Rs. 1,09,900 and the expenditure Rs. 2,01,821, deficit Rs. 91,921. The cost of 349,990 cubic feet of timber in round logs supplied to the saw mill up to the end of the year amounting to Rs. 87,497–8–0 at 4 annas per cubic foot was not adjusted during the year.

A rogue elephant in Chandragiri reserve attacked Mr. Shelswell, Assistant Conservator, and party in Coupe II on 1st February 1924, the former sustaining a broken leg and other injuries.

Man-eating tigers killed two men, one in Gogodo during fellings in January 1924 and the other in Brahmanasai reserve in April 1924, while engaged in sweeping a fire line.

Mr. H. Tireman, Chief Conservator visited the district in January 1924. The Conservator visited the district in August 1923 and January and February 1924. Dr. C. F. C. Beeson, Forest Entomologist, Dehra Dun, visited Russellkonda in February 1924 to investigate the white ant and fungus attack on young sal.

The Vernacular Training School was held in Ghumsur for the seventh time from January to June 1924.

1924–25.—*Russellkonda Saw Mill.*—The Saw Mill completed its third year. There was a silent season from 7th April to 31st May to reduce the stocks of sawn timber which had become high and due in part to shortage of water for the boiler. The old well again proved insufficient and water was drawn from the Russellkonda reservoir. The new well was completed before the monsoon of 1925. The saw mill made the first payments whatsoever for the timber supplied to it namely Rs. 70,023 for 280,092 cubic feet. At the end of the year there remained to be paid for the balance of logs of 196,022 cubic feet. The quantity of timber supplied to the saw mill was 14,125 logs of 144,569 cubic feet, of which 3,521 cubic feet were rejected. In 1924 the District Forest Officer issued orders that no more logs of *Terminalia tomentosa* were to be brought to Russellkonda. When the mill definitely stopped taking *Terminalia tomentosa* in 1923–24 the District Forest Officer tried hard to get a market at Russellkonda and Berhampur. The attempts proved costly. There was no market for *Terminalia tomentosa* nearer than Vizagapatam.

67,652 cubic feet of old rejected timber were sold from the exploitation depot for Rs. 12,431. In the felling areas at stump site large quantities of rejected logs were also being sold but they had the advantage of being fresh.

Bridges and buildings.—The following works were carried out :—

(1) Two culverts on Tilisingi-Tarasingi road and a bridge over a nala.
(2) Out-houses and stables of Tarasingi rest-house was completed.
(3) Five camping sheds at Rs. 30 each in Bontha range.
(4) Subordinates' shed at Kuddapada.

Fire season.—The fire season of 1924 was nearly as favourable as that of last year. Fifty-seven fires occurred altogether and burnt 17,688 acres. There was no rain in February and March. April had slight showers and during May rain was general. In the rigidly protected area 12 fires burnt 437 acres. In the partially protected area 27 fires burnt 10,386 acres and in the unprotected area 16 fires burnt 6,865 acres. In Chandragiri reserve 5 miles of fire lines could not be cleared and burnt on account of the fear of the rogue elephant which attacked Mr. Shelswell and party on 1st February 1924. The biggest fire raged from 7th to 10th April in Baiballi reserve and burnt 6,000 acres. There were no fires in Kukuluba range. Two cases of incendiarism were detected. The accused in one was prosecuted and sentenced to one month's rigorous imprisonment in the lower Court and on appeal it was reduced to eighteen days. The other case was pending with the Magistrate.

Exploitation.—283,000 cubic feet of timber and 154,000 cubic feet of fuel were extracted departmentally. 154,000 cubic feet of timber and 629,000 cubic feet of fuel were removed by purchasers.

Free grants were made to villagers for rebuilding the houses destroyed by fire.

The revenue was Rs. 1,89,259 and the expenditure Rs. 1,74,280, surplus Rs. 14,979. The increase in revenue was mainly due to the payment of Rs. 43,314 by Parry & Co. for the timber supplied during 1922–23 and 1923–24. They had still to pay Rs. 49,006 for 196,022 cubic feet. A sum of Rs. 47,204 was also realized as the recovery of investments under Government Commercial undertakings (direct and indirect charges).

A man-eating tiger killed a forest watcher named Balla Naiko in April 1924 while engaged in sweeping a fire line. The Government in G.O. No. 403, Finance (Pension), dated 1st September 1924, were pleased to sanction an extraordinary family pension of Rs. 4 to his son, which is tenable for 12 years. The presence of man-eating tigers generally interfered with the progress of timber operations, fire protection, etc., in Kukuluba and Bontha ranges.

His Excellency the Governor and Lady Goschen stayed at Russellkonda in January 1924 and visited Udayagiri. Mr. H. Tireman, the Chief Conservator, was also at Russellkonda and Udayagiri.

Mr. S. H. Howard, Silviculturist, Dehra Dun, paid visits to Ghumsur in June 1924 and January 1925.

The Conservator of Forests visited the district in September 1924.

The Vernacular Training School was held in Ghumsur for the eighth time from January to June 1925.

1925–26.—*Russellkonda Saw Mill.*—One of the outstanding features of the year was the closure of the saw mill for seven months from May to November 1925, owing to the very large stocks of sawn timber in the mill depot. The sales during this period exceeded expectations and the stock was greatly reduced. As it was not certain what the future policy would be, it was decided to restrict the supply of logs to the mill and consequently all fellings in the Selection Working Circle were stopped. Only such timber as had to be felled in the Plains Sal Timber Working Circle was extracted. In November a meeting was held at Russellkonda at which the following were present :—Sir Mahomed Usman Sahib, the Home Member, Mr. T. Moir, the Finance Member, Mr. H. Tireman, the Chief Conservator, Mr. A. F. Minchin, the Conservator, and Mr. F. D. Ardagh, the District Forest Officer. The whole prospects of the mill were examined and revenues explored by which it might be possible to improve the financial position of the mill. No definite decision was arrived at. The Agent of the mill returned from six months' leave and reopened the mill at the end of November, and sawing was resumed. At the end fo December matters became serious and the mill was threatened with a shortage of timber which would have brought it to a standstill. In January 1926 telegraphic orders to resume fellings were received from the Chief Conservator. The fellings were therefore resumed in the areas in which all preparations had been made and these were pushed on as fast as possible, so as to get into the mill as much timber as possible in the dry weather.

The cost of the timber supplied was not to exceed five annas per cubic foot. Fellings were therefore executed in the most accessible reserves in contravention to the prescriptions of the Working Plan.

Reservation.—Nine acres of Dumu Dumi reserve adjoining a temple Buda Kendu was dis-reserved to provide accommodation for pilgrims on festival days.

Road.—The following road was constructed during the year : Rambha-Balinkia diversion road, 5 furlongs 1 chain.

Buildings.—The following buildings were constructed :—

1. Quarters for a forester and two guards at Bhagvanpur.
2. Foresters' quarters at Gayagonda.

3. Foresters' quarters at Rambha.
4. Motor shed at Tilisingi bungalow.
5. Forest guard's shed at Durgaprasad, Gundribadi, Rambha, Samarada, Doloko, Bhagvanpur, Kottakala and Tilisingi.
6. Inspection shed at Tarasingi.
7. Foresters' quarters at Latipada was in progress.

Fire season.—In the fire season of 1925 there were 63 fires which burnt an area of 15,857 acres. There was no rain in February. In March and April slight showers fell and in May rains were general. In the rigidly protected area 14 fires burnt 1,076 acres. One of these fires occurred in Rambha Ravine Coupe II and burnt 49 acres. In the partially protected area 35 fires burnt 10,795 acres and in the unprotected area 14 fires burnt 3,986 acres.

Exploitation.—194,000 cubic feet of timber and 39,000 cubic feet of fuel were extracted departmentally. 153,000 cubic feet of timber and 298,000 cubic feet of fuel were removed by purchasers.

The revenue for the year was Rs. 1,47,331 and the expenditure Rs. 1,55,555, the deficit Rs. 8,224. Parry & Co. had still to pay Rs. 13,775 for 55,098 cubic feet of logs.

The quantity of timber supplied to the mill during the year was 71,945 cubic feet.

The rogue elephant pulled a villager out of a machan from which he was guarding his crops and killed him within two furlongs of Gerada rest-house. The rogue tusker was shot by Mr. Minchin, Conservator, I Circle, on 28th October 1925 in Chandragiri reserve. The elephant was a perfect herd bull and its death was received with great joy by the local inhabitants.

The Conservator of Forests visited the district in October and November 1925. The Chief Forest Engineer Mr. C. S. Martin visited the district in March 1926 to examine the possibility of reducing the cost of timber transport from the felling areas to the mill.

The Vernacular Training School was held in Ghumsur for the ninth time from January to June 1926.

1926–27.—*Russellkonda Saw Mill.*—The saw mill completed its fifth year of existence. In order to supply timber to the mill at a cost not exceeding 5 annas per cubic foot, the prescriptions of the Working Plan were ignored to a great extent and timber was extracted from the most accessible reserves. The quantity of timber supplied to the mill during the year was 210,352 cubic feet.

Roads and bridges.—The following roads and bridges were constructed :—

1. Kutranalo bridge on Tilisingi-Tarasingi road at a cost of Rs. 1,588.
2. Rambha-Balinkia diversion road was completed.
3. Two Irish bridges on Tilisingi-Tarasingi road at a cost of Rs. 130.

Buildings.—The following buildings were constructed :—

1. Foresters' quarters at Latipada.
2. Reconstruction of rest-house at Kurcholi.
3. Forest guard's sheds at Chahali, Biripodaro, Kullada, Potharapalli, Rogoda.
4. Inspection sheds at Chirikipada, Bhagvanpur, Manitara, Motchabadi and Tanapalli.

Fire season.—The fire season of 1926 was phenomenally successful. There were only 7 fires burning an area of 426 acres. There were unusual rains in January, February and March. But April, May and the early part of June were very dry. Temperatures up to 115° are known to have been recorded at Russellkonda in June. In the rigidly protected area two fires burnt 4 acres. In the partially protected area four fires burnt 412 acres and in the unprotected area three fires burnt 23 acres. There were no fires in Mojjagoda, Kukuluba and Buguda ranges. A considerable amount of work was done in maintaining the prescribed width of fire lines which in many places had been allowed to narrow down. Also a large number of dead logs lying across the fire lines were got cleared. Khonds of various ranges were specially summoned and interviewed and their duties were explained to them by the Assistant Conservator in charge of fire protection.

Early burning of one chain width of forest around the Ravine coupes of Rambha reserve was tried experimentally to afford extra protection to the coupes. The operation was found difficult to be carried out efficiently without very close supervision.

The Khonds were not granted the usual concessions of building materials, etc., although they rendered service in general protection and fire protection of the forests.

Exploitation.—339,000 cubic feet of timber and 49,000 cubic feet of fuel were extracted departmentally. 159,000 cubic feet of timber and 939,000 cubic feet of fuel were removed by purchasers.

The revenue was Rs. 1,92,752 and the expenditure Rs. 1,92,007, surplus Rs. 745.

The Conservator of Forests Mr. R. D. Richmond visited the district in June and August, November-December 1926. The Chief Conservator Mr. Latham visited the district in August 1926. The Chief Forest Engineer Mr. Martin visited the district in March 1927.

The Vernacular Training School was held in Ghumsur for the tenth time from 10th January 1927.

1927–28.—The Russellkonda Saw Mill completed its sixth year and it was finally shut down in June 1928. The Forest department supplied the mill with 202,563 cubic feet of logs, of which 9,257 cubic feet were rejected at the mill. *Pterocarpus marsupium* was not sent to the mill after the Superintendent wrote in January 1928 that he could not sell it except in planks 8 to 12 inches

wide and that the few logs reaching the mill were too small to give that size. A programme of mill timber supplies for 1927–28 had been drawn up by the Conservator in October 1926 and enumerations and estimates were completed ahead of the year. Actually it was found that the supplies of the best quality mill timber were overestimated and moreover the mill cut 206,702 cubic feet as against an estimate of 180,000 cubic feet.

During the year, inspection of the timber depots and stock-taking were insisted on by the Conservator as well as the maintenance of all the prescribed registers. Felling areas were subdivided into divisions and fellings restricted to one division at a time. The whole staff were very heavily worked from the District Forest Officer downwards. There was something of a crisis in June 1927 and the following months. On 17th June 1927 the stocks of logs at the mill fell to 18,353 cubic feet. During the south-west monsoon the position got worse and on 7th September 1927 there were only 7,000 cubic feet at the mill, barely two weeks supply. Carting became difficult and during this trying period the District Forest Officer frequently conferred with the Revenue Divisional Officer, Tahsildar, Revenue Inspectors and Karjis. Much pressure was brought to bear on the villagers to cart timber from the forests and carts were imported from Dasapalla and Niagarh Feudatory States (Orissa).

Naturally stocks of rejected timber mounted and these were lying all over the forests. The volume of rejected timber felled in 1927–28 was about 329,000 cubic feet.

During the year, in June to October 1927, enumeration of all standing sal trees fit for the mill within a distance of 25 miles from Russellkonda was made without distinction as to Working Circle limits or the provisions of the Working Plan. 33,184 trees were enumerated and these were considered to represent one-and-a half year's supply to the mill. Largely in consequence of this showing it was decided by Government to close the mill at the end of June 1928.

Reservation.—18·6 acres of unreserved land adjoining Galleri reserve was notified under section 16 and declared as reserved forest, Galleri extension No. 2.

Roads.—The following road work was carried out in the year :—Trial alignment of Kukuluba-Gayagonda road and its extension to Rudapodaro (2) Alignment of a new trace from the Tilisingi metalled road to Tarasingi.

Buildings.—The following building works were undertaken :—

1. Kitchen to the rest-house at Budaguda.
2. Forester's quarters at Gerada.
3. Forest guard's sheds at Kattachira and Sindhukuppa.
4. Bodogundribadi rest-house in progress.

Owing to floods in October 1927 chiefly in Pondakhol and Surada ranges, three wooden bridges built by the Forest department some ten or fifteen years ago, over the Odangi nalo near Gazilbadi were washed away on 5th October 1927.

The fire season of 1927 was disastrous when compared with the previous year. There were 71 fires which burnt an area of 63,724 acres. In the rigidly protected area 14 fires burnt 6,493 acres. In the partially protected area 34 fires burnt 43,649 acres and in the unprotected area 23 fires burnt 13,582 acres.

Early burning was continued in Mojjagoda range. A margin of one chain width of forest around the Ravine Coupes of Rambha reserve was early burnt to afford special protection to the regenerated coupes. The operation was also tried around the Plains Sal Timber Coupes of Buguda range and it led to unsatisfactory results. In these cases the coupes had no cleared lines for their perimeter and consequently fires escaped into the coupes while the forest around them was being early burnt. Thirty acres of Coupe III, six acres of Coupe IV, one-fith of an acre of Coupe V, and ten acres of Coupe VII got burnt.

Exploitation.—5,52,000 cubic feet of timber and 33,000 cubic feet of fuel were extracted departmentally. 75,000 cubic feet of timber and 435,000 cubic feet of fuel were removed by purchasers.

The revenue was Rs. 1,59,128 and the expenditure Rs. 2,59,251, deficit Rs. 1,00,123. The deficit was largely due to the exploitation for the Saw Mill.

Man-eating tigers were unduly prominent in Kukuluba and Bontha ranges. Thirty-two men were killed around Tarasingi. The presence of man-eating tigers greatly interfered with the progress of timber operations, fire protection and other works.

The Conservator of Forests, I Circle, visited the division in June 1927, November 1927 and January 1928. The Working Plans Conservator, Mr. A. Wimbush, visited the division in July 1927 and January 1928.

The Ghumsur Working Plan was taken up for revision on 23rd September 1927 by Mr. M. Kesavanunni Nayar, the Working Plans Officer. His staff consisted of one clerk and he was mainly engaged in the collection of Control figures and posting them up to date in proper forms ; as the Control data of the District Forest Office were in great confusion and were also in arrears by two years.

From 1st July 1927 the District Forest Officer assumed charge of the forests in the Balliguda Agency.

The Vernacular Training School was held in Ghumsur for the eleventh time from 10th January 1928.

1928–29.—*Russellkonda Saw Mill.*—The outstanding event of the year is the closure of the Russellkonda Saw Mill on the 30th of June 1928, under the orders of Government. The Saw Mill

buildings, machinery and stock were finally handed over by Parry & Co. to the District Forest Officer on the 8th of July 1928. Since the closure of the mill, the department have been concerned with the care of the machinery and buildings and with the liquidation of the mill assets. The stock of sawn timber, of the motor lorry and car, the timber shed at Berhampur and various smaller articles were disposed of by sale. Towards the close of the year Government ordered the transfer of the mill buildings and furniture to the Public Works Department for the use of the newly formed Agency division of that department. The transfer was effected after the close of the year under review. Various spare parts and stores were set apart for transfer to the Central Stores at Olavakkot and arrangements were made to send some of the tramway materials to Nellore. The rails were sold to the Executive Engineer, Ganjam. Regarding the mill building and machinery Government ordered that the disposal was to be arranged with an Engineering firm on a commission basis and the matter was being dealt with by the Chief Forest Engineer.

Reservation.—7·6 acres of unreserved land adjoining the Tiliki reserve was notified under section 16 of the Forest Act.

Roads.—The following road works were carried out :—

1. Metalling the Rambha rest-house road (not completed).
2. Earth road from Tilisingi to Tarasingi was commenced.
3. Earth road from Kukuluba to Gayagonda was commenced.

Buildings.—The following buildings were constructed :—

1. Bodogundribadi rest-house was completed.
2. Well at Kurcholi rest-house was in progress.

Fire season.—The fire season of 1928 was not so severe as the previous year. There were 43 fires which burnt an area of 24,146 acres ; the main feature being that there were no fires in Pondakhol range. In the rigidly protected area eight fires burnt 943 acres. The whole of Plains Sal Timber Coupe I and II-a in Chandragiri reserve were burnt on 13th March 1928. In the partially protected area 19 fires burnt 19,583 acres, and in the unprotected area 16 fires burnt 5,221 acres.

Early burning was continued around the Ravine Coupes of Mojjagoda range and around the Plains Sal Timber Coupes of Buguda range.

Exploitation.—104,000 cubic feet of timber and 22,000 cubic feet of fuel were extracted departmentally, 243,000 cubic feet of timber, 585,000 cubic feet of fuel were removed by purchasers.

The bulk of the reject timber that had accumulated in the previous years was sold during the year.

The revenue was Rs. 2,27,193 and the expenditure Rs. 1,76,476, surplus Rs. 50,717. The surplus was due partly to the sale of large quantities of reject timber left unsold in the previous years and partly to recoveries of investments in the Russellkonda Saw Mill.

The man-eating tiger of Chandragiri reserve which was responsible for many deaths during last year was not in evidence since November 1928. It is believed to have been wounded by a local shikari or has perhaps died a natural death.

Mr. A. Wimbush, Acting Chief Conservator, visited the district in January 1929. Conservator, I Circle, visited the district in May 1928, January and March 1929. Mr. A. F. Minchin, the Working Plans Conservator, visited the district in March 1929.

The Vernacular Training School was not held during the year.

The revision of the Ghumsur Working Plan by Mr. M. K. Nayar under the orders of the Conservator of Forests, III (Working Plans) Circle, continued throughout the year.

1929–30.—After the closure of the Russellkonda Saw Mill last year, the Ganjam Forest staff settled down to its normal activities. Under the orders of Government the value of all mill buildings including that of the Saw Mill less its machinery was paid by the Public Works Department to the Forest Department. The machinery in the mill still remained undisposed of.

Roads and bridges.—The following roads and bridges were constructed during the year:

1. Bridge over Kutra nalo on Tilisingi-Tarasingi road.
2. Metalling Rambha rest-house road (completed).
3. Earthen road from Tilisingi to Tarasingi (completed).

Buildings—The following buildings were constructed :

1. Kitchen to the Inspection shed at Mojjagoda.
2. Second kitchen for the Russellkonda Circuit house.
3. Bodogundribadi rest–house, plastering and whitewashing.
4. Well at Kurcholi rest–house (completed).

Fire season.—The fire season of 1929 was a somewhat severe one. There were very few of the usual thunderstorms in April and May. There were 61 fires which burnt an area of 22,486 acres. In the rigidly protected area five fires burnt 780 acres. Seven acres of Plains Sal Timber Coupe III in Kukuluba range, 175 acres of Pole Coupes in Buguda and Surada ranges were burnt. In the partially protected area 37 fires burnt 15,736 acres and in the unprotected area nineteen fires burnt 5,970 acres.

Early burning was not continued in Mojjagoda and Buguda ranges.

13,000 cubic feet of timber and 16,000 cubit feet of fuel were extracted departmentally. 420,000 cubic feet of timber and 404,000 cubic feet of fuel were removed by purchasers.

No departmental fellings were undertaken within reserves. Efforts were concentrated on the disposal of the accumulated stock of rejects from the old mill fellings. This was completed during the year leaving a clear sheet with which to begin new fellings under the prescriptions of the revised Working Plan in 1930–31.

Free grants were made to the value of Rs. 381 from reserves and Rs. 1,773 from unreserves to villagers for rebuilding the houses destroyed by fire.

The revenue was Rs. 1,37,174 and the expenditure Rs. 1,43,427, deficit Rs. 6,253. The deficit was largely due to considerable expenditure on reservation in the Balliguda Agency.

Mr. R. D. Richmond, the Chief Conservator, visited the district in February 1930. Mr. J. H. Longrigg, Acting Conservator, I Circle, visited the district in January and February 1930.

The revision of the Ghumsur Working Plan by Mr. M. Kesavanunni Nayar continued throughout the year.

APPENDIX IV.

Note on Sal Regeneration Experiments in the Ravine Working Circle.

1. In order to determine the best method of establishing adequate sal regeneration in the Ravine Working Circle, a 2–acre experimental plot was opened near Rambha, south of Ravine Coupe VII in Rambha reserve. The ground selected was typically ‘ ravine ’ with a lot of bamboo and some overmature sal trees and other species, and was markedly deficient in ‘ sal switches.’ There were 702 trees of all sizes varying from saplings to trees over 4 feet in girth and 290 bamboo clumps. The area appeared to have been burnt over frequently in the past.

2. Sal advance growth in various stages was present to the extent of 2,600 plants per acre, of which 850 only had reached the switch stage and the remainder were of doubtful vitality. They were by no means uniformly distributed.

3. In April 1928, all bamboo and miscellaneous tree growth under 2 feet in girth were felled and left to dry on the ground in the hot weather. The cut material was burnt *in situ* in May. The object was to admit sufficient light to the ground and prepare a good germinating seed bed.

4. It was intended to sow one half of the plot with sal seeds and to leave the other half to regenerate naturally from seed falling on the ground. 1928 was a poor seed year for sal owing to poor flowering and the premature storms of May. The unsown half was therefore put down as a failure.

5. In early June, sal seed was collected with great difficulty from around Rambha. 23½ bags of seed were sorted out and gave only 2½ bags of sound seed and 2¼ bags of germinating seed. Total 4¾ bags or 20 per cent.

6. The monsoon broke out on the 11th of June in the afternoon, accompanied by thunderstorms and heavy rain.

7. On the 12th of June, sowing was done in cloudy weather, as follows :—

Plot 1.—1 chain × 2½ chains = 2½ square chains were broadcast with 1½ bags of germinating seed. Many seeds were breaking to pieces on account of the cotyledons having got loose inside the seed coat. An extra ¾ bag was subsequently added to this plot.

Plot 3.—1 chain × 1 chain = 1 square chain was dibbled with ½ a bag of seed by pricking the ground with the point of a stick and inserting a seed in each hole. The soil was pressed round the seed with the wings projecting out.

Plot 4.—1 chain × 1 chain = 1 square chain was sown with ½ bag of seed broadcast as in Plot I.

8. On 15th June 1928, a small plot No. 5, ½ chain × ½ chain = ¼ square chain was planted with 64 sal stumps varying in size from a lead pencil to an index finger and trimmed to 3″ and 6″ lengths. The espacement was 4′ 3″ in eight lines. The stumps were made from switch plants dug out from the forest.

9. Field observations made on the following dates showed that wherever surface wash occurred, the seeds had been washed away and massed up in the debris. This was noticeable in Plots 1, 2 and 4 in which the seeds were merely broadcast on the ground. The dibbled Plot No. 3 was unaffected.

10. Eight days after sowing, Plot No. 3 dibbled, showed about 100 per cent germination. In the other plots there were casualties due to insects, monkeys and decay of seeds for want of sufficient moisture. Wind and water too had frequently disturbed the germinating seeds, resulting in the drying off of their radicles.

11. *Enumerations in August* 1928.—In the middle of August 1928, sal regeneration was enumerated in all the four plots distinguishing the current year's seedlings from the survivals of the previous years. The results are expressed below :—

Plot No.	Area.	Current year's seedlings—1928.	Sal switches and old survivals.	Total.	Number of current year's (1928) seedlings per acre.
1	2½ square chains ..	3,013	336	3,349	12,052
2	2½ ,, ..	2,638	237	2,875	10,552
3	1 square chain ..	2,494	17	2,511	24,940
4	1 ,, ..	1,022	34	1,056	10,220

It will be seen that the greatest success was obtained in Plot No. 3—dibbled. The number of seedlings is about 25,000 per acre and is more than double the number obtained in any other plot.

12. *Plot No. 5—Stump planting.*—Nine stumps out of 64 had sprouted and then died back. It could not then be stated whether their roots were alive or whether they were quite dead. The others were healthy.

13. A Control Plot No. 6, of 2 chains × 2½ chains = 5 square chains had also been opened in April 1928. Enumeration of the sal advanced growth then gave 703 switches and seedlings of which the established regeneration was counted and found to be 365 plants. The control plot was similar in appearance to the other areas with mixed tree growth and bamboos including six mature sal trees. The control plot was to be fire protected and left to regenerate naturally from seed.

14. *Enumerations in July* 1929.—The plots were visited in July 1929 for enumerating the sal advance growth. Grass, weeds and bamboo regrowth had made their appearance and they had to be cut out to facilitate the enumerations. The seedlings benefited indirectly by this weeding. In the course of enumerations the new seedlings of 1929 were distinguished separately in order to discover the mortality among the 1928 sowings. For this purpose it was assumed that the old advance growth which existed at the time of the 1928 sowings, had survived in 1929. The results of enumerations are expressed as follows :—

Plot No.	Area.	Results of enumerations.			Total.	Calculation of mortality.		
		Natural seedlings of 1929.	Old advance growth.	Survivals of 1928 sowings.		Seedlings in August 1928 per acre.	Survivals in July 1929 per acre.	Mortality per cent.
1	2½ square chains.	254	336	2,218	2,808	12,052	8,872	26
2	2½ ,,	734	237	2,437	3,408	10,552	9,748	8
3	1 square chain.	50	17	2,002	2,069	24,940	20,020	20
4	1 ,,	16	34	825	875	10,220	8,250	20
5	¼ ,,	58 stumps alive and six dead.						
6	5 square chains.	169	905	..	1,074	In April 1928. *1,406	*1,810	..

* *Note.*—Plot No. 6 (control plot) was first enumerated in April 1928 during the hot weather and presumably some living plants were missed owing to their having dried back.

15. In Plot No. 3 (dibbled), seedlings of 1928 sowings were alive to the extent of 20,020 per acre. In Plot No. 5, of the 64 stumps planted in 1928, 58 were found to be alive and six had disappeared altogether. In the control plot, the enumerations showed an increase of 29 per cent in the old advance growth. This is explained by the fact that at the time of the 1928 enumeration in April, a number of seedlings which had dried off above ground were taken to be dead. Apparently their root system was alive and in the following monsoon they must have reappeared.

16. *Expenditure incurred in the experiment.*—The following is a summary of the expenses incurred in conducting the experiment up to June 1928.

	RS.	A.
(1) Selection and demarcation of 2-acre plot and enumeration of standing growth	10	8
(2) Felling bamboos and miscellaneous species below 2 feet in girth over two acres at Rs. 8 per acre	16	0
(3) Opening ½ acre control plot	2	8
(4) Line clearing	2	0
(5) Burning the felling refuse over two acres	5	11
(6) Collection and transport of 23½ bags of sal seed	7	0
(7) Sorting sound seed	2	4
(8) Broadcast sowing six square chains	0	4
(9) Dibbling seed over one square chain	0	2
(10) Staking and planting 64 sal stumps	1	4
(11) Miscellaneous, gunny bags, etc.	4	8
Total ..	52	1

17. *Conclusions.*—The experiment has so far enabled the writer to draw the following conclusions :—

(1) In order to achieve any degree of success with sal seed sowings, it is very necessary to sort out the sound seed and reject the useless ones. Sound seed can readily be indentified by their green colour. Dead seed is brown and the cotyledons inside will also be found to have turned brown. Seed of large size should be preferred to seed of small size.

(2) Dibbling seed in the ground ensures the greatest degree of success. They do not attract wild animals. Being imbeded in the soil they germinate more quickly than the broadcast seed and get immediately rooted in the soil. This is a very important factor in the case of sal because the seeds do not keep for a long time and perish if they fail to germinate and strike root within ten or fifteen days after their fall.

(3) Seeds broadcast on the ground are exposed to a number of risks. If rain fails for days together, the seeds germinate rather indifferently. They cannot then absorb sufficient moisture through the narrow surface of contact with the ground. After germination, wind or water disturb them a good deal and prevent their striking root quickly before they lose their vitality. They are particularly attractive to cockchafers and animals like pigs and even monkeys.

(4) It is too early to say whether stump planting will be a success ; the stumps now planted for this experiment must be watched for some years and further experiments made before any decision can be arrived at.

18. It may thus be noted that given suitable soil, it is possible to start in one year, seedling regeneration of about 20,000 per acre by the process of dibbling *selected fertile* seed. The seedling regeneration has low vitality and will serve no purpose for regenerating an area by clear-fellings. It has to become established, that is, it must progress into the switch stage. To what extent the artificially produced seedlings will develop into the switch stage and the period required for it are not known and have yet to be studied.

APPENDIX V.

Plains Sal Timber Working Circle.

List of Coupes and Compartments with their areas arranged by reserves.

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series I.			
	Russellkonda Range.			
Baiballi ..	Dhowmundia.	1	..	8
	Do. ..	2	..	5
	Do. ..	3	..	2
	Do. ..	4	..	12
	Do. ..	5	..	19
	Khalagam ..	6	..	1
	Do. ..	7	..	167
	Boragam ..	8	..	3
	Do. ..	9	..	18
	Do. ..	10	..	56
	Birkot ..	11	..	1
	Do. ..	12	..	8
	Do. ..	13	..	26
	Bopangi ..	14	..	9
	Do. ..	15	..	26
	Do. ..	16	..	44
	Do. ..	17	..	5
	Total ..	..	..	410
Tiliki ..	Hathiguda ..	1	..	242
	Tiliki ..	2	..	16
	Do. ..	3	..	16
	Do. ..	4	..	12
	Do. ..	5	..	60
	Do. ..	6	..	1
	Do. ..	7	..	4
	Total ..	..	..	351
	Mojjagoda Range.			
Galleri ..	Suradevi ..	1	..	38
	Do. ..	2	..	8
	Do. ..	3	..	36
	Do. ..	4	..	26
	Do. ..	5	..	8
	Do. ..	6	..	190
	Do. ..	7	2	..
	Biripadaro ..	8	..	127
	Do. ..	9	..	2
	Do. ..	10	..	33
	Kaliponka ..	11	..	82
	Do. ..	12	..	18
	Do. ..	13	..	5
	Do. ..	14	..	22
	Do. ..	15	..	10
	Do. ..	16	..	42
	Kutunikuppa.	XI b	8	80
	Do. ..	17	..	42
	Do. ..	18	..	35

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series I—*cont.*			
	Mojjagoda Range—cont.			
Galleri ..	Miniari ..	X	..	138
	Do. ..	XI a	..	46
	Do. ..	19	..	26
	Do. ..	20	..	52
	Do. ..	21	..	31
	Do. ..	22	..	11
	Do. ..	23	..	8
	Do. ..	24	..	49
	Do. ..	25	..	22
	Do. ..	26	..	2
	Do. ..	27	..	125
	Do. ..	28	..	1
	Do. ..	29	..	4
	Do. ..	30	..	30
	Khariguda ..	31	..	161
	Bhalluguda ..	32	..	28
	Do. ..	33	..	11
	Brahmanapadaro ..	34	..	15
	Do. ..	35	..	5
	Do. ..	36	..	13
	Do. ..	37	..	4
	Do. ..	38	..	32
	Do. ..	39	..	28
	Burudupali ..	40	..	13
	Do. ..	41	..	10
	Total ..	..	10	1,669
Darpangia ..	Baniakoradabadi ..	1	..	1
	Do. ..	2	..	9
	Do. ..	3	..	2
	Do. ..	4	..	12
	Do. ..	5	..	21
	Do. ..	6	..	72
	Bamsokot ..	7	..	2
	Do. ..	8	..	22
	Do. ..	9	..	31
	Do. ..	10	..	24
	Do. ..	11	..	1
	Do. ..	12	..	1
	Kanubandho ..	13	..	94
	Do. ..	14	..	34
	Kondikutti ..	15	..	74
	Darpangia ..	16	..	1
	Do. ..	17	..	44
	Do. ..	18	..	108
	Do. ..	19	..	86
	Do. ..	20	..	2
	Do. ..	21	..	2
	Do. ..	22	..	15
	Total ..	..	..	658

PLAINS SAL TIMBER WORKING CIRCLE—*cont*;

List of Coupes and Compartments with their areas arranged by reserves—cont.

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
	Series I—*cont.*			
	Mojjagoda Range—cont.		ACS.	ACS.
Rambha ..	Poitagam ..	1	..	13
	Do. ..	2	..	11
	Do. ..	3	..	24
	Bhalluguda ..	4	..	38
	Do. ..	5	..	35
	Brahmana-padaro ..	6	..	24
	Total ..	..	..	146
Dhimirijoli.	Sundaraguma ..	1	..	12
	Do. ..	2	..	33
	Dhimirijoli ..	3	..	132
	Do. ..	4	..	2
	Do. ..	5	..	2
	Billuapada ..	6	..	7
	Do. ..	7	..	42
	Golabandho ..	8	..	10
	Do. ..	9	..	10
	Harigodo ..	10	..	10
	Total ..	..	..	260
	Kukuluba Range.			
Chandragiri.	Kriamba ..	IV a	..	54
	Do. ..	V a	..	88
	Do. ..	1	..	239
	Baghodhora ..	2	..	44
	Ambakono ..	3	..	86
	Do. ..	4	..	8
	Samarada ..	5	..	174
	Chakundapalli.	6	..	47
	Chandragiri ..	I	..	28
	Do. ..	II a	28	122
	Do. ..	II b	..	80
	Do. ..	III a	38	24
	Do. ..	III b	..	6
	Do. ..	III c	18	6
	Do. ..	7	..	2
	Do. ..	8	..	562
	Do. ..	9	..	172
	Do. ..	10	2	..
	Do. ..	11	4	..
	Do. ..	12	15	..
	Do. ..	13	25	..
	Kutunikuppa.	14	..	66
	Sappokhollo ..	VI a	10	72
	Do. ..	VI b	..	68
	Do. ..	15	..	6
	Do. ..	16	..	31
	Do. ..	17	5	..
	Do. ..	18	..	54
	Do. ..	19	..	6
	Do. ..	20	..	10
	Kutranalo ..	III d	..	3
	Borosingi ..	III e	15	54
	Bhallumundia.	IV b	3	59
	Do. ..	IV c	7	10
	Do. ..	IV d	..	20
	Tarasingi ..	V d	..	11
	Ronoghonta ..	V c	..	17
	Do. ..	V d	..	30
	Do. ..	V e	..	7
	Total ..	..	170	2,256
Ambazora ..	Kukuluba ..	1	..	9
	Do. ..	2	..	9
	Do. ..	3	..	31
	Jadadhara ..	4	..	56
	Do. ..	5	..	12
	Gayagonda ..	6	..	6
	Do. ..	7	..	31
	Do. ..	8	..	9
	Do. ..	9	..	5

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
	Series I—*cont.*			
	Kukuluba Range—cont.		ACS.	ACS.
Ambazora ..	Kothelogodo ..	10	..	9
	Do. ..	11	..	2
	Do. ..	12	..	7
	Rodopodaro ..	13	..	12
	Sarthabadi ..	14	..	73
	Do. ..	15	..	17
	Narayangodo	16	..	71
	Total ..	..	..	355
Gundribadi	Bodogundribadi	1	..	12
	Saliki	2	..	100
	Kathopothani	3	..	18
	Delingapadaro.	4	..	9
	Total ..	..	..	139
	Bontha Range.			
Brahmansai	Gadiapada ..	VII a	..	47
	Do. ..	VII b	..	81
	Do. ..	VIII	..	159
	Do. ..	1	..	36
	Do. ..	2	..	3
	Do. ..	3	..	63
	Do. ..	4	..	9
	Do. ..	5	..	52
	Kenthosorolo	IX	64	64
	Do. ..	6	..	22
	Do. ..	7	..	390
	Do. ..	8	7	..
	Dongabhumi ..	9	..	26
	Tirigocha ..	10	..	5
	Do. ..	11	..	71
	Do. ..	12	..	29
	Bhumigerada	13	..	28
	Do. ..	14	..	70
	Total ..	..	71	1,155
Paichalia ..	Ramalokhono.	1	..	30
	Thalakomono ..	2	..	55
	Total ..	..	..	85
Gogodo ..	Ramalokhono	1	..	41
	Do. ..	2	..	6
	Kojiripalli ..	3	..	15
	Thalakomono	4	..	33
	Do. ..	5	..	98
	Nondapaju ..	6	..	12
	Do. ..	7	..	22
	Baddobhumi ..	8	..	5
	Do. ..	9	..	6
	Syarimalo ..	10	..	49
	Do. ..	11	..	7
	Do. ..	12	..	10
	Gogodo ..	13	..	9
	Do. ..	14	..	140
	Do. ..	15	..	18
	Do. ..	16	..	81
	Do. ..	17	2	..
	Do. ..	18	..	13
	Do. ..	19	..	14
	Delingapadoro.	20	..	2
	Do. ..	21	..	18
	Total ..	..	2	599
	Series II.			
	Buguda Range.			
Kriamba ..	Kriamba ..	IIc	..	3
	Do. ..	III	..	46
	Do. ..	IV a	..	8
	Do. ..	IV b	..	2

PLAINS SAL TIMBER WORKING CIRCLE—*cont.*

List of Coupes and Compartments with their areas arranged by reserves—cont.

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series II—*cont.*			
	Buguda Range—cont.			
Kriamba ..	Kriamba ..	IV c	..	3
	Do. ..	IV d	..	2
	Do. ..	IV e	..	11
	Do. ..	IV f	..	3
	Do. ..	IV g	..	10
	Do. ..	IV h	..	8
	Do. ..	V	17	15
	Do. ..	VI	..	54
	Do. ..	VII a	..	13
	Do. ..	VII b	..	16
	Do. ..	VII c	..	11
	Do. ..	VIII a	..	21
	Do. ..	VIII b	..	2
	Do. ..	VIII c	2	10
	Do. ..	IX a	..	1
	Do. ..	IX b	..	31
	Do. ..	IX c	..	3
	Do. ..	IX d	..	10
	Do. ..	IXe	..	1
	Do. ..	Xa	..	11
	Do. ..	1	..	66
	Kanusorolo ..	X b	..	1
	Do. ..	X c	..	6
	Thalasoro ..	X d	..	19
	Do. ..	XI a	..	22
	Do. ..	XI b	3	7
	Do. ..	2	..	32
	Do. ..	3	..	4
	Do. ..	4	..	2
	Vondhari ..	5	..	21
	Chirkipada ..	6	..	21
	Do. ..	7	..	13
	Do. ..	8	..	6
	Do. ..	9	..	2
	Do. ..	10	..	7
	Do. ..	11	..	4
	Do. ..	12	..	4
	Do. ..	13	..	2
	Do. ..	14	..	51
	Total ..	..	22	585
Kurcholi ..	B. Kurcholi ..	I a	..	31
	Do. ..	I b	..	5
	Do. ..	I c	..	1
	Do. ..	II a	..	24
	Do. ..	II b	..	15
	Total ..	..	..	76
	Surada Range.			
Rogada ..	Dhowpalli ..	1	..	16
	Do. ..	2	..	7
	Gurandia ..	3	..	9
	Do. ..	4	..	6
	Do. ..	5	..	2
	Do. ..	6	..	2
	Do. ..	7	..	48
	Do. ..	8	..	31
	Do. ..	9	..	5
	Do. ..	10	..	2
	Tikidi ..	11	..	6
	Do. ..	12	..	17
	Do. ..	13	..	6
	Do. ..	14	..	2
	Do. ..	15	..	18
	Do. ..	16	..	50
	Do. ..	17	..	4
	Do. ..	18	..	3
	Do. ..	19	..	1
	Do. ..	20	..	10
	Rogada ..	21	..	9
	Do. ..	22	..	46
	Do. ..	23	..	1
	Boladu ..	24	..	45
	Total ..	..	..	346

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series II—*cont.*			
	Surada Range—cont.			
Vinjigiri ..	Vinjigiri ..	1	..	40
	Total ..	..	..	40
Hukuma ..	Bakhara ..	1	..	10
	Total ..	..	..	10
Bondagocha.	Korada ..	1	..	20
	Kansora ..	2	..	6
	Do. ..	3	..	13
	Do. ..	4	..	3
	Total ..	..	..	42
Pippalaponka.	Bhagvanpur ..	1	..	116
	Rushikulya ..	2	..	6
	Do. ..	3	..	7
	Do. ..	4	..	6
	Do. ..	5	..	8
	Sappodhimira	6	..	290
	Do. ..	7	..	35
	Do. ..	8	..	65
	Dantolingi ..	9	..	59
	Do. ..	10	..	59
	Sagadapada ..	11	..	24
	Raiguda ..	12	..	18
	Do. ..	13	..	101
	Adijola ..	14	..	14
	Bolasi ..	15	..	10
	Do. ..	16	..	47
	Do. ..	17	..	14
	Do. ..	18	..	7
	Do. ..	19	..	40
	Do. ..	20	..	8
	Do. ..	21	..	24
	Nondopodoro	22	..	6
	Do. ..	23	..	4
	Kegaponka ..	24	..	11
	Do. ..	25	..	13
	Do. ..	26	..	4
	Do. ..	27	..	3
	Rushikulya ..	28	..	11
	Do. ..	29	..	4
	Do. ..	30	..	8
	Do. ..	31	..	4
	Do. ..	32	..	14
	Do. ..	33	..	15
	Total ..	..	..	1,055
Mundapitta	Uddisingi ..	1	..	3
	Madhurabandho	2	..	7
	Do.	3	..	7
	Do.	4	..	4
	Karuballi ..	5	..	14
	Gummarigonda.	6	..	8
	Khojiripalli ..	7	..	92
	Do. ..	8	..	6
	Sivaguda ..	9	..	1
	Adijola ..	10	..	20
	Do. ..	11	..	39
	Sondaballi ..	12	..	25
	Do. ..	13	2	..
	Do. ..	14	2	..
	Total ..	..	4	226
Dheppaguda.	Koravali ..	1	..	2
	Total ..	..	..	2

PLAINS SAL TIMBER WORKING CIRCLE—*cont.*

List of Coupes and Compartments with their areas arranged by reserves—cont.

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series II—*cont.* *Pondakhol Range.*			
Pondakhol ..	Gazilabadi ..	1	..	37
	Do. ..	2	..	9
	Rushikulya ..	3	..	10
	Kegaponka ..	4	..	10
	Do. ..	5	..	13
Ponkalagam block.	Koroda ..	1	..	16
	Do. ..	2	..	10
	Total ..	..	..	105
Dhowgam ..	Rushikulya ..	1	..	4
	Do. ..	2	..	3
	Do. ..	3	..	5
	Do. ..	4	..	41
	Do. ..	5	..	8
	Gamponkalo ..	6	..	24

Reserve.	Block.	Coupe or compartment number.	Area. First quality.	Area. Second quality.
			ACS.	ACS.
	Series II—*cont.* *Pondhakhol Range*—cont.			
Dhowgam ..	Odungi ..	7	..	9
	Do. ..	8	..	7
	Do. ..	9	..	3
	Do. ..	10	..	4
	Kalama ..	11	..	4
	Do. ..	12	..	57
	Total ..	..	..	169
Dabuki ..	Korada ..	1	..	3
	Do. ..	2	..	9
	Do. ..	3	..	7
	Do. ..	4	..	2
	Rushikulya ..	5	..	15
	Total ..	..	..	37

APPENDIX VI.

RAVINE WORKING CIRCLE.

List of Coupes and Compartments with their areas arranged by reserves.

Range.	Reserve.	Coupe or compartment number.	Area.
			ACS.
Russellkonda ..	Kaliamba ..	1	34
		2	93
		3	37
		4	49
	Total ..	..	213
	Baiballi ..	1	20
		2	22
		3	4
		4	10
		5	2
		6	34
		7	11
		8	64
	Total ..	..	167
Mojjagoda ..	Rambha ..	I	131
		II a	43
		II b	49
		c	39
		III a	39
		III b	28
		IV a	26
		IV b	6
		V a	26
		V b	15
		VI a	14
		VI b	20
		VI c	13
		VII	42
		VIII a	40
		VIII b	74
		1	7
		2	55
		3	11
		4	32
		5	191
		6	29
		7	3
		8	32
		9	8
		10	10
		11	250
	Total ..	..	1,233

Range.	Reserve.	Coupe or compartment number.	Area.
			ACS.
Mojjagoda ..	Darpangia ..	1	15
		2	4
		3	352
		4	103
		5	1
		6	288
		7	7
		8	60
		9	46
		10	37
		11	7
	Total ..	..	920
	Dhimirijoli ..	1	36
		2	67
	Total ..	..	103
	Chokkapad ..	1	10
		2	10
		3	21
		4	62
		5	16
		6	104
		7	2
		8	12
		9	5
		10	4
		11	5
		12	2
		13	1
		14	1
		15	36
		16	11
		17	20
		18	21
		19	5
	Total ..	..	348
Kukuluba ..	Chandragiri ..	1	18
		2	7
		3	2
		4	15
		5	30
		6	20
		7	9

RAVINE WORKING CIRCLE—*cont.*

List of Coupes and Compartments with their areas arranged by reserves—cont.

Range.	Reserve.	Coupe or compartment number.	Area.
			ACS.
Kukuluba.	Chandragiri	8	82
		9	36
		10	98
		11	38
		12	32
		13	6
	Total ..	..	393
	Ambazora ..	1	4
		2	82
		3	55
		4	10
		5	10
		6	76
		7	29
		8	73
		9	4
		10	50
		11	42
		12	24
		13	3
		14	3
		15	10
		16	4
		17	3
		18	160
		19	14
		20	27
		21	70
		22	3
		23	25
		24	22
		25	31
		26	1
		27	2
	Total ..	..	837
	Gundribadi ..	1	20
		2	4
		3	9
		4	26
		5	4
		6	35
	Total ..	..	98
Bontha ..	Brahmansai ..	1	15
		2	5
		3	129
		4	9
	Total ..	..	158
Buguda ..	Kriamba ..	1	109
		2	765
	Total ..	..	874
Surada ..	Rogoda ..	1	3
		2	5
		3	9
		4	34
	Total ..	..	51

Range.	Reserve.	Coupe or compartment number.	Area.
			ACS.
Surada ..	Bondagocha ..	1	3
		2	1
		3	2
	Total ..	..	6
	Pippalaponka.	1	16
		2	2
		3	3
		4	8
		5	2
		6	13
		7	3
		8	22
		9	5
		10	3
		11	18
		12	5
		13	5
	Total ..	..	105
Pondakhol ..	Pondakhol ..	1	11
		2	52
		3	13
		4	1
		5	10
		6	16
		7	19
		8	1
		9	66
		10	2
		11	1
		12	16
		13	5
		14	11
		15	1
		16	29
		17	9
		18	15
		19	2
		20	19
		21	40
		22	76
		23	6
		24	98
		25	11
		26	2
		27	3
		28	2
		29	1
		30	6
		31	5
		32	4
		33	2
		34	2
		35	227
		36	122
	Total ..	..	906
	Dhowgam ..	1	3
		2	1
		3	2
		4	4
	Total ..	..	10
	Dabuki ..	1	3
	Total ..	..	3

APPENDIX VII.

Plains Sal Pole Working Circle.

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres.

**Note.*—In the case of worked coupes the sal bearing area is indicated by the numerator and the total area by the denominator of a fraction wherever Sal and Non-Sal have been separately distinguished.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal.* Total.	Old Series. Coupe number.	Old Series. Name of Series.
	1. Kontaipalli Series (Russellkonda Range).				
1903–04	Kaliamba	I	29	I	Kontaipalli.
1904–05	Do.	II	32/35	II	Do.
1905–06	Do.	III	34/36	III	Do.
1906–07	Do.	IV	30/34	IV	Do.
1907–08	Do.	V	40	V	Do.
1908–09	Do.	VI	24	VI	Do.
1909–10	Do.	VII	29/40	VII	Do.
1911–12	Do.	VIII	21/41	VIII	Do.
1912–13	Do.	IX	41/44	IX	Do.
1913–14	Do.	X	52/56	X	Do.
1914–15	Do.	XI	32	XI	Do.
1915–16	Do.	XII	40	XII	Do.
1916–17	Do.	XIII	19/33	XIII	Do.
1917–18	Do.	XIV	35	XIV	Do.
1918–19	Do.	XV	34	XV	Do.
1919–20	Do.	XVI a	16	I a	Govindapur.
	Do.	b	7	b	Do.
1920–21	Do.	XVII a	45	XVI	Kontaipalli.
	Do.	b	10/20	II	Govindapur.
1921–22	Do.	XVIII a	44	XVII	Kontaipalli.
		b	20	III	Govindapur.
1922–23	Do.	XIX	40	XVIII	Kontaipalli.
1923–24	Do.	XX	44	XIX	Do.
1924–25	Do.	XXI	60	XX	Do.
1925–26	Do.	XXII a	48	XXI a	Do.
	Do.	XXII b	5	XXI b	Do.
1926–27	Do.	XXIII	82	XXII	Do.
1927–28	Do.	XXIV	74/80	XXIII	Do.
1928–29	Do.	XXV	19/64	XXIV	Do.
1929–30	Do.	XXVI a	18	XXV a	Do.
	Do.	b	12	b	Do.
	Do.	c	6		
	Do.	1	3		
	Do.	2	2		
	Do.	3	146		
	Do.	4	11		
	Do.	5	5		
	Do.	6	10		
	Do.	7	1		
	Do.	8	12		
	Do.	9	3		

	* Sal.	Non-sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	1,042	122	1,164
Unworked compartments	193	..	193
Total	1,235	122	1,357

Annual coupe — 1,235 ÷ 40 = 31 acres.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	2. Bankanedi Series (Russellkonda Range).				
1922–23 ..	Kaliamba	I	27/38	IV	Govindapur.
1923–24 ..	Do.	II	47/52	V	Do.
1924–25 ..	Do.	III	75	VI	Do.
1925–26 ..	Do.	IV	59	VII	Do.
1926–27 ..	Do.	V	47	VIII	Do.
1927–28 ..	Do.	VI	25	IX	Do.
1928–29 ..	Do.	VII	54	X	Do.
1929–30 ..	Do.	VIII	30	XI	Do.
	Do.	10	22		
	Do.	11	2		
	Do.	12	2		
	Do.	13	2		
	Do.	14	1		
	Do.	15	2		
	Do.	16	2		
	Do.	17	2		
	Do.	18	3		
	Do.	19	2		
	Do.	20	2		
	Do.	21	3		
	Do.	22	3		
	Do.	23	4		
	Do.	24	2		
	Do.	25	8		
	Do.	26	5		
	Do.	27	2		
	Do.	28	272		
	Do.	29	4		
	Do.	30	2		
	Do.	31	3		
	Do.	32	6		
	Do.	33	16		
	Do.	34	17		
	Do.	35	1		
	Do.	36	318		
	Do.	37	6		
	Do.	38	2		
	Do.	39	11		
	Do.	40	1		
	Do.	41	1		
	Do.	42	3		
	Do.	43	67		
	Do.	44	23		
	Do.	45	4		
	Do.	46	8		
	Do.	47	56		
	Do.	48	2		
	Do.	49	25		

	Sal. ACS.	Non-sal. ACS.	Total. ACS.
Worked coupes	364	16	380
Unworked compartments	937	..	937
Total ..	1,301	16	1,317

Annual coupe = 1,301 ÷ 40 = 33 acres.

Year	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	3. Gundribadi Series (Russellkonda Range).				
1903–04 ..	Tiliki	I	33/34	I	Gundribadi.
1904–05 ..	Do.	II	26	II	Do.
1905–06 ..	Do.	III	14/26	III	Do.
1906–07 ..	Do.	IV	33	IV	Do.
1907–08 ..	Do.	V	44	V	Do.
1908–09 ..	Do.	VI	36/40	VI	Do.
1909–10 ..	Do.	VII	28	VII	Do.
1912–13 ..	Do.	VIII	60	VIII	Do.
1913–14 ..	Do.	IX	40	IX	Do.
1914–15 ..	Do.	X	55	X	Do.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	3. Gudribadi Series (Russellkonda Range)—cont.				
1915–16 ..	Tiliki	XI	41	XI	Gundribadi.
1916–17 ..	Do.	XII	34	XII	Do.
1917–18 ..	Do.	XIII a	26	XIII	Do.
	Do.	b	33/38	XIV	Do.
1918–19 ..	Do.	XIV	34	XV	Do.
1921–22 ..	Do.	XV	37	XVI	Do.
1922–23 ..	Do.	XVI	46/52	XVII	Do.
1923–24 ..	Do.	XVII	32/54	XVIII	Do.
1924–25 ..	Do.	XVIII	50/54	XIX	Do.
1925–26 ..	Do.	XIX a	13/23	XX	Do.
	Do.	b	25	XX	Do.
1926–27 ..	Do.	XX	72/81	XXI	Do.
1927–28 ..	Do.	XXI	49/89	XXII	Do.
1928–29 ..	Do.	XXII	51	XXIII	Do.
1929–30 ..	Do.	XXIII	44/53	XXIV	Do.
	Do.	1	50		
	Do.	2	6		
	Do.	3	222		
	Do.	4	2		
	Do.	5	8		
	Do.	6	6		
	Do.	7	13		
	Do.	8	1		
	Do.	9	1		
	Do.	10	3		
	Do.	11	1		
	Do.	12	3		
	Do.	13	21		
	Do.	14	2		
	Do.	15	6		
	Do.	16	66		

	Sal. ACS.	Non-sal. ACS.	Total. ACS.
Worked coupes	956	122	1,078
Unworked compartments	411	..	411
Total ..	1,367	122	1,489

Annual coupe = 1,367 ÷ 40 = 34 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	4. Hathiguda Series (Russellkonda Range).				
1928–29 ..	Baiballi	I	3/41	I	Reptipalli.
1929–30 ..	Do.	II	36/40	II	Do.
	Tiliki	17	3		
	Do.	18	223		
	Do.	19	12		
	Do.	20	319		
	Do.	21	141		
	Do.	22	5		
	Do.	23	9		
	Do.	24	67		
	Do.	25	5		
	Do.	26	12		
	Do.	27	9		
	Do.	28	10		
	Do.	29	151		
	Do.	30	70		

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		4. *Hathiguda Series* (*Russellkonda Range*)—cont.			
1929–30 ..	Tiliki	31	54		
	Do.	32	2		
	Do.	33	26		
	Do.	34	24		
	Do.	35	97		
	Do.	36	2		
	Do.	37	1		
	Do.	38	6		
	Do.	39	7		
	Do.	40	14		
	Do.	41	2		
	Do.	42	11		
	Do.	43	2		
	Baiballi	1	1		
	Do.	2	1		
	Do.	3	90		
	Do.	4	14		
	Do.	5	181		
	Do.	6	30		
	Do.	7	17		
	Do.	8	30		
	Do.	9	11		
	Do.	10	82		
	Do.	11	2		

	Sal.	Non-sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	39	42	81
Unworked compartments	1,743	..	1,743
Total ..	1,782	42	1,824

Annual coupe = 1,782 ÷ 40 = 45 acres.

5. *Kullada Series* (*Russellkonda Range*).

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
1903–04 ..	Kullada	I	$\frac{6}{9}$	I	Kullada.
1904–05 ..	Do.	II	10	II	Do.
1905–06 ..	Do.	III	8	III	Do.
1906–07 ..	Do.	IV	13	IV	Do.
1907–08 ..	Do.	V	$\frac{45}{94}$	V	Do.
1908–09 ..	Do.	VI	$\frac{10}{23}$	VI	Do.
1909–10 ..	Do.	VII	$\frac{25}{33}$	VII	Do.
1910–11 ..	Do.	VIII	$\frac{23}{30}$	VIII	Do.
1911–12 ..	Do.	IX a	$\frac{24}{54}$	IX	Do.
	Do.	b	$\frac{7}{13}$	IX	Do.
1912–13 ..	Do.	X	$\frac{33}{38}$	X	Do.
1913–14 ..	Do.	XI	$\frac{4}{12}$	XI	Do.
1914–15 ..	Do.	XII	$\frac{15}{28}$	XII	Do.
1915–16 ..	Do.	XIII	$\frac{22}{25}$	XIII	Do.
1917–18 ..	Do.	XIV	26	XIV	Do.
1918–19 ..	Do.	XV	$\frac{27}{28}$	XV	Do.
1919–20 ..	Do.	XVI	50	XVI	Do.
1921–22 ..	Do.	XVII	$\frac{28}{30}$	XVII	Do.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	5. *Kullada Series* (*Russellkonda Range*)—cont.				
1922–23 ..	Kullada	XVIII	52	XVIII	Kullada.
1932–24	Do.	XIX	47/52	XIX	Do.
1924–25 ..	Do.	XX a	22	XX	Do.
	Do.	b	7/19	XX	Do.
1925–26 ..	Do.	XXI	76/88	XXI	Do.
1926–27 ..	Do.	XXII	38/41	XXII	Do.
1927–28 ..	Do.	XXIII	39/73	XXIII	Do.
1928–29	Do.	XXIV	15/45	XXIV	Do.
1929–30 ..	Do.	XXV	25	XXV	Do.
	Do.	1	67		
	Do.	2	2		
	Do.	3	5		
	Do.	4	1		
	Do.	5	60		
	Do.	6	3		
	Do.	7	5		
	Do.	8	1		
	Do.	9	1		
	Do.	10	1		
	Do.	11	17		
	Do.	12	2		
	Do.	13	19		
	Do.	14	4		
	Do.	15	3		
	Do.	16	7		
	Do.	17	4		
	Do.	18	4		
	Do.	19	8		
	Do.	20	4		
	Do.	21	27		
	Do.	22	4		
	Do.	23	27		
	Do.	24	2		
	Do.	25	4		

	Sal.	Non-sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	697	244	941
Unworked compartments	282	..	282
Total	979	244	1,223

Annual coupe = 979 ÷ 40 = 24 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	6. *Siddapodoro Series* (*Mojjagoda Range*).				
1916–17 ..	Galleri	I	19/26	I a, b	Siddapodoro.
1917–18 ..	Do.	II	24/30	II	Do.
1918–19 ..	Do.	III a	17/18	III	Do.
	Do.	b	20/24	III	Do.
1925–26 ..	Do.	IV	30/34	IV	Do.
1927–28 ..	Do.	V	37/40	V	Do.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	6. *Siddapodors Series* (*Mojjagoda Range*)—cont.				
1928–29	.. Galleri	VI	25/31	VI	a, b Siddapodoro.
1929–30	.. Do.	VII	15/27	VII	Do.
	Do.	1	2		
	Do.	2	30		
	Do.	3	2		
	Do.	4	5		
	Do.	5	11		
	Do.	6	47		
	Do.	7	10		
	Do.	8	29		
	Do.	9	199		
	Do.	10	207		
	Do.	11	39		
	Do.	12	1		
	Do.	13	2		
	Do.	14	270		
	Do.	15	11		
	Do.	16	150		
	Do.	17	4		
	Do.	18	12		
	Do.	19	2		
	Do.	20	4		
	Do.	21	7		
	Do.	22	3		
	Do.	23	2		
	Do.	24	5		
	Do.	25	18		
	Do.	26	4		
	Do.	27	9		
	Do.	28	12		
	Do.	29	34		
	Do.	30	7		
	Do.	31	10		
	Do.	32	13		
	Do.	33	4		
	Do.	34	72		
	Do.	35	12		
	Do.	36	4		
	Do.	37	1		
	Do.	38	120		
	Do.	39	122		
	Do.	40	1		
	Do.	41	5		
	Do.	42	1		
	Do.	43	40		
	Do.	44	128		

	Sal.	Non-sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	187	43	230
Unworked compartments	1,671	..	1,671
Total	1,858	43	1,901

Annual coupe = 1,858 ÷ 40 = 46 acres.

7. *Mojjagoda Series* (*Mojjagoda Range*).

Reserve.	Compartment number.	Area.
Galleri	45	6
Do.	46	2
Do.	47	108
Do.	48	85
Do.	49	80
Do.	50	4
Do.	51	119
Do.	52	8
Do.	53	76
Do.	54	6
Do.	55	39
Do.	56	52
Do.	57	7
Do.	58	57
Do.	59	10
Do.	60	8
Do.	61	3
Do.	62	331

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	7. *Mojjagoda Series* (*Mojjagoda Range*)—cont.				
	Galleri	63	45		
	Do.	64	4		
	Do.	65	1		
	Do.	66	2		
	Do.	67	75		
	Do.	68	104		
	Do.	69	4		
	Do.	70	2		
	Do.	71	2		
	Do.	72	2		
	Do.	73	2		
	Do.	74	8		
	Do.	75	217		
	Do.	76	8		
	Do.	77	3		
	Do.	78	1		
	Do.	79	24		
	Do.	80	7		
	Do.	81	2		
	Do.	82	26		
	Do.	83	8		
	Do.	84	2		
	Do.	85	1		
	Do.	86	2		
	Do.	87	14		
	Do.	88	2		
	Do.	89	3		
	Do.	90	5		
	Do.	91	7		
	Do.	92	3		
	Do.	93	10		
	Do.	94	2		
	Do.	95	3		
	Do.	96	2		

	Sal.	Non-sal.	Total.
	ACS.		ACS.
Worked coupes	1,604	..	1,604
Unworked compartments	..	..	..
Total ..	1,604	..	1,604

Annual coupe = 1,604 ÷ 40 = 40 acres.

8. *Galleri Series* (*Mojjagoda Range*).

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
1923–24	.. Galleri	I	25/26	I	Galleri.
1924–25	.. Do.	II	21	II	Do.
1925–26	.. Do.	III	25	III	Do.
1926–27	.. Do.	IV	30	IV	Do.
1927–28	.. Do.	V	24/27	V	Do.
1928–29	.. Do.	VI	21/25	VI	Do.
	Do.	97	169		
	Do.	98	8		
	Do.	99	6		
	Do.	100	2		
	Do.	101	1		
	Do.	102	64		
	Do.	103	5		
	Do.	104	1		
	Do.	105	20		
	Do.	106	55		
	Do.	107	6		
	Do.	108	5		
	Do.	109	6		
	Do.	110	63		
	Do.	111	11		
	Do.	112	16		
	Do.	113	5		
	Do.	114	2		
	Do.	115	9		
	Do.	116	6		
	Do.	117	44		

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe. number.	Old Series. Name of Series.
		8. Galleri Series (Mojjagoda Range)—cont.			
1928–29 ..	.. Galleri	118	37		
	Do.	119	11		
	Do.	120	10		
	Do.	121	5		
	Do.	122	6		
	Do.	123	2		
	Do.	124	3		
	Do.	125	20		
	Do.	126	3		
	Do.	127	2		
	Do.	128	1		
	Do.	129	10		
	Do.	130	18		
	Do.	131	20		
	Do.	132	40		
	Do.	133	10		
	Dhimirijoli	1	330		
	Do.	2	10		
	Do.	3	12		
	Do.	4	20		
	Do.	5	9		
	Do.	6	10		
	Do.	7	8		
	Do.	8	25		
	Do.	9	1		
	Do.	10	1		
	Do.	11	2		
	Do.	12	2		
	Do.	13	7		
	Do.	14	2		
	Do.	15	5		
	Do.	16	58		
	Do.	17	7		
	Do.	18	1		
	Do.	19	2		
	Do.	20	6		
	Do.	21	2		
	Do.	22	145		
	Do.	23	2		
	Do.	24	3		
	Do.	25	10		
	Do.	26	4		
	Do.	27	12		
	Do.	28	21		
	Do.	29	4		
	Do.	30	3		
	Do.	31	1		

	Sal.	Non-sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	146	8	154
Unworked compartments ..	1,427	..	1,427
Total ..	1,573	8	1,581

Annual coupe = 1,573 ÷ 40 = 39 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe. number.	Old Series. Name of Series.
		9. Gujrali Series (Mojjagoda Range).			
1929–30	.. Galleri	I	34	VII	Galleri.
	Do.	134	11		
	Do.	135	3		
	Do.	136	42		
	Do.	137	16		
	Do.	138	44		
	Do.	139	40		
	Do.	140	2		
	Do.	141	32		
	Do.	142	9		
	Do.	143	1		
	Do.	144	1		
	Do.	145	2		
	Do.	146	6		
	Do.	147	30		
	Do.	148	109		
	Do.	149	108		
	Do.	150	1		
	Do.	151	31		
	Do.	152	1		

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	9. *Gujrali Series (Mojjagoda Range)*—cont.				
1929–30 ..	Galleri	153	8		
	Do.	154	2		
	Do.	155	234		
	Do.	156	2		
	Do.	157	1		
	Do.	158	1		
	Do.	159	5		
	Do.	160	27		
	Do.	161	37		
	Do.	162	5		
	Do.	163	181		
	Do.	164	23		
	Do.	165	12		
	Do.	166	42		
	Do.	167	2		
	Do.	168	1		
	Do.	169	4		
	Do.	170	4		
	Do.	171	2		
	Do.	172	5		
	Do.	173	16		
	Do.	174	2		
	Do.	175	1		
	Do.	176	2		
	Do.	177	4		
	Do.	178	5		
	Do.	179	2		
	Do.	180	443		
	Do.	181	5		
	Do.	182	169		

	Sal.	Non-sal.	Total.
	ACS.		ACS.
Worked coupes	34	..	34
Unworked compartments	1,736	..	1,736
Total ..	1,770	..	1,770

Annual coupe = 1,770 ÷ 40 = 44 acres.

10. *Tilisingi Series (Kukuluba Range).*

Reserve.	Coupe or Compartment number.	Area—Sal. Total.
Chandragiri	1	93
Do.	2	19
Do.	3	4
Do.	4	59
Do.	5	3
Do.	6	5
Do.	7	10
Do.	8	4
Do.	9	1
Do.	10	76
Do.	11	91
Do.	12	6
Do.	13	25
Do.	14	15
Do.	15	3
Do.	16	6
Do.	17	8
Do.	18	5
Do.	19	4
Do.	20	20
Do.	21	19
Do.	22	20
Do.	23	16
Do.	24	42
Do.	25	3
Do.	26	115
Do.	27	7
Do.	28	76
Do.	29	1
Do.	30	2
Do.	31	16
Do.	32	39
Do.	33	28
Do.	34	14
Do.	35	20

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	10. *Tilisingi Series* (*Kukuluba Range*)—cont.				
	Chandragiri	36	29		
	Do.	37	2		
	Do.	38	1		
	Do.	39	2		
	Do.	40	9		
	Do.	41	1		
	Do.	42	40		
	Do.	43	2		
	Do.	44	3		
	Do.	45	1		
	Do.	46	2		
	Do.	47	17		
	Do.	48	11		
	Do.	49	12		
	Do.	50	4		
	Do.	51	2		
	Do.	52	1		

	Sal.	Non-sal.	Total.
	ACS.		ACS.
Worked coupes	..	..	..
Unworked compartments ..	1,014	..	1,014
Total ..	1,014	..	1,014

Annual coupe = 1,014 ÷ 40 = 25 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	11. *Sorisamolo Series* (*Kukuluba Range*).				
1918–19 ..	Chodiapalli ..	I	21		
	Do.	1	2		
	Do.	2	104		
	Do.	3	11		
	Do.	4	143		
	Do.	5	1		
	Chandragiri	53	9		
	Do.	54	6		
	Do.	55	2		
	Do.	56	12		
	Do.	57	3		
	Do.	58	21		
	Do.	59	102		
	Do.	60	94		
	Do.	61	9		
	Do.	62	43		
	Do.	63	7		
	Do.	64	2		
	Do.	65	61		
	Do.	66	16		
	Do.	67	1		
	Do.	68	2		
	Do.	69	38		
	Do.	70	6		
	Do.	71	4		
	Do.	72	6		
	Do.	73	7		
	Do.	74	15		
	Do.	75	24		
	Do.	76	349		
	Do.	77	45		
	Do.	78	3		
	Do.	79	81		
	Do.	80	142		
	Do.	81	2		
	Do.	82	2		

	Sal.	Non-sal.	Total.
	ACS.		ACS.
Worked coupes	21	..	21
Unworked compartments ..	1,375	..	1,375
Total ..	1,396	..	1,396

Annual coupe = 1,396 ÷ 40 = 35 acres.

[PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		12. *Gerada Series* (*Bontha Range*).			
1903–04 ..	Jaganadaprasad ..	I	31/64	I	Kepati.
1904–05 ..	Do. ..	II	51/53	II	Do.
1906–07 ..	Do. ..	III	41	III	Do.
1907–08 ..	Do. ..	IV	51	IV	Do.
1909–10 ..	Do. ..	V	3/7	V	Do.
1910–11 ..	Do. ..	VI	20/26	VI	Do.
1911–12 ..	Do. ..	VII	32	VII	Do.
1912–13 ..	Do. ..	VIII	28	VIII	Do.
1913–14 ..	Do. ..	IX	32	IX	Do.
1914–15 ..	Do. ..	X	30/31	X	Do.
1915–16 ..	Do. ..	XI	27/30	XI	Do.
1919–20 ..	Do. ..	XII	17	XII	Do.
1923–24 ..	Do. ..	XIII	17	XIII	Do.
1924–25 ..	Do. ..	XIV	54	XIV	Do.
1925–26 ..	Do. ..	XV	48	XV	Do.
1926–27 ..	Do. ..	XVI	52	XVI	Do.
1927–28 ..	Do. ..	XVII	71	XVII	Do.
1928–29 ..	Do. ..	XVIII	66/90	XVIII	Do.
1929–30 ..	Do. ..	XIX	37	XIX	Do.
	Do. ..	1	75		
	Do. ..	2	2		
	Do. ..	3	2		
	Do. ..	4	319		
	Do. ..	5	6		
	Do. ..	6	1		
	Do. ..	7	3		
	Do. ..	8	3		
	Do. ..	9	15		
	Do. ..	10	293		
	Do. ..	11	3		
	Do. ..	12	7		
	Do. ..	13	3		
	Do. ..	14	12		
	Do. ..	15	27		
	Do. ..	16	1		
	Do. ..	17	84		
	Do. ..	18	73		
	Do. ..	19	7		
	Do. ..	20	44		
	Do. ..	21	2		

	Sal. ACS.	Non-sal. ACS.	Total. ACS.
Worked coupes	708	73	781
Unworked compartments ..	982	..	982
Total ..	1,690	73	1,763

Annual coupe = 1,690 ÷ 40 = 42 acres.

13. *Jaganadaprasad Series* (*Bontha Range*).

Reserve.	Coupe or Compartment number.	Area—Sal. Total.
Jaganadaprasad ..	22	2
Do. ..	23	78
Do. ..	24	3
Do. ..	25	6
Do. ..	26	28
Do. ..	27	6
Do. ..	28	8
Do. ..	29	5
Do. ..	30	15
Do. ..	31	26
Do. ..	32	10
Do. ..	33	9

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal-Total.	Old Series. Coupe number.	Old Series. Name of Series.
	13. *Jaganadaprasad Series (Bontha Range)*—cont.				
	Jaganadaprasad ..	34	67		
	Do. ..	35	3		
	Do. ..	36	1		
	Do. ..	37	19		
	Do. ..	38	2		
	Do. ..	39	8		
	Do. ..	40	3		
	Do. ..	41	4		
	Do. ..	42	32		
	Do. ..	43	45		
	Do. ..	44	1		
	Do. ..	45	46		
	Do. ..	46	2		
	Do. ..	47	8		
	Do. ..	48	40		
	Do. ..	49	210		
	Do. ..	50	81		
	Do. ..	51	7		
	Do. ..	52	20		
	Do. ..	53	2		

	Sal. ACS.	Non-Sal.	Total. ACS.
Worked coupes	..	..	..
Unworked compartments	797	..	797
Total ..	797	..	797

Annual coupe = 797 ÷ 40 = 20 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal-Total.	Old Series. Coupe number.	Old Series. Name of Series.
	14. *Brahmanasai Series (Bontha Range).*				
	Brahmanasai	1	24		
	Do.	2	2		
	Do.	3	7		
	Do.	4	4		
	Do.	5	4		
	Do.	6	2		
	Do.	7	8		
	Do.	8	27		
	Do.	9	8		
	Do.	10	8		
	Do.	11	33		
	Do.	12	2		
	Do.	13	16		
	Do.	14	49		
	Do.	15	2		
	Do.	16	6		
	Do.	17	17		
	Do.	18	18		
	Do.	19	19		
	Do.	20	6		
	Do.	21	4		
	Do.	22	13		
	Do.	23	23		
	Do.	24	36		
	Do.	25	23		
	Do.	26	2		
	Do.	27	14		
	Do.	28	122		
	Do.	29	2		
	Do.	30	3		
	Do.	31	11		
	Do.	32	175		
	Do.	33	8		
	Do.	34	5		
	Do.	35	15		
	Do.	36	3		
	Do.	37	2		
	Do.	38	32		
	Do.	39	135		
	Do.	40	14		
	Do.	41	13		

	Sal. ACS.	Non-Sal.	Total. ACS.
Worked coupes	..	..	..
Unworked compartments	917	..	917
Total ..	917	..	917

Annual coupe = 917 ÷ 40 = 23 acres.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		15. *Chirikipada Series* (*Buguda Range*).			
1918–19 ..	Kriamba	I	44	I	Chirikipada.
1919–20 ..	Do.	II	30	II	Do.
1920–21 ..	Do.	III	38 — 46	III	Do.
1921–22 ..	Do.	IV	45 — 46	IV	Do.
1922–23 ..	Do.	V	50	V	Do.
1923–24 ..	Do.	VI	56 — 58	VI	Do.
1924–25 ..	Do.	VII	43 — 52	VII	Do.
1925–26 ..	Do.	VIII	38 — 58	VIII	Do.
1926–27 ..	Do.	IX	63 — 71	IX	Do.
1927–28 ..	Do.	X	39 — 85	X	Do.
1928–29 ..	Do.	XI	60 — 103	XI	Do.
1929–30 ..	Do.	XII	25 — 30	XII	Do.
	Do.	52	6		
	Do.	53	446		
	Do.	54	47		
	Do.	55	29		
	Do.	56	1		
	Do.	57	12		
	Do.	58	3		
	Do.	59	2		
	Do.	60	1		
	Do.	61	23		
	Do.	62	3		
	Do.	63	64		
	Do.	64	2		
	Do.	65	1		
	Do.	66	6		
	Do.	67	883		
	Do.	68	1		
	Do.	69	2		
	Do.	70	1		
	Do.	71	1		
	Do.	72	48		
	Do.	73	24		
	Do.	74	2		
	Do.	75	15		
	Do.	76	3		
	Do.	77	7		
	Do.	78	7		
	Do.	79	5		
	Do.	80	12		
	Do.	81	4		
	Do.	82	3		
	Do.	83	1		
	Do.	84	1		

	Sal.	Non-Sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	531	142	673
Unworked compartments	1,666	..	1,666
Total ..	2,197	142	2,339

Annual coupe = 2,197 ÷ 40 = 55 acres.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	16. *Bhagavanpur Series* (*Buguda Range*).				
	Kriamba	1	3		
	Do.	2	1		
	Do.	3	1		
	Do.	4	65		
	Do.	5	34		
	Do.	6	3		
	Do.	7	2		
	Do.	8	66		
	Do.	9	1		
	Do.	10	28		
	Do.	11	1		
	Do.	12	313		
	Do.	13	6		
	Do.	14	6		
	Do.	15	14		
	Do.	16	3		
	Do.	17	4		
	Do.	18	576		
	Do.	19	2		
	Do.	20	1		
	Do.	21	7		
	Do.	22	3		
	Do.	23	1		
	Do.	24	12		
	Do.	25	1		
	Do.	26	3		
	Do.	27	21		
	Do.	28	2		
	Do.	29	39		
	Do.	30	14		
	Do.	31	2		
	Do.	32	3		
	Do.	33	8		
	Do.	34	2		
	Do.	35	3		
	Do.	36	1		
	Do.	37	8		
	Do.	38	131		
	Do.	39	39		
	Do.	40	2		
	Do.	41	6		
	Do.	42	4		
	Do.	43	4		
	Do.	44	13		
	Do.	45	156		
	Do.	46	5		
	Do.	47	1		
	Do.	48	2		
	Do.	49	24		
	Do.	50	7		
	Do.	51	2		

	Sal.	Non-Sal.	Total.
	ACS.	..	ACS.
Worked coupes	..	..	..
Unworked compartments	1,656	..	1,656
Total ..	1,656	..	1,656

Annual coupe = 1,656 ÷ 40 = 41 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	17. *Kurcholi Series* (*Buguda Range*).				
1929–30	.. Kurcholi A ..	I	17/48	I	Kurcholi.
	Do.	1	8		
	Do.	2	4		
	Do.	3	16		
	Do.	4	50		
	Do.	5	18		
	Do.	6	4		
	Do.	7	3		
	Do.	8	44		
	Do.	9	171		
	Do.	10	7		
	Do.	11	24		
	Do.	12	2		
	Do.	13	19		

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PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—**cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	17. *Kurcholi Series* (*Buguda Range*)—cont.				
1929-30.	Kurcholi A	14	10		
	Do.	15	44		
	Do.	16	2		
	Kurcholi B	1	218		
	Do.	2	145		
	Do.	3	2		
	Do.	4	2		
	Do.	5	124		
	Do.	6	3		
	Do.	7	6		

	Sal. acs.	Non-Sal. acs.	Total. acs.
Worked coupes	17	31	48
Unworked compartments	926	..	926
Total	943	31	974

Annual coupe = 943 ÷ 40 = 24 acres.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	18. *Panchabuthi Series* (*Buguda Range*).				
1919–20	Panchabuthi	I	36	I	Panchabuti.
1920–21	Do.	II	31/33	II	Do.
1921–22	Do.	III	46/55	III	Do.
1922–23	Do.	IV	38	IV	Do.
1923–24	Do.	V	40	V	Do.
1924–25	Do.	VI	44	VI	Do.
1925–26	Do.	VII	35	VII	Do.
1926–27	Do.	VIII	56	VIII	Do.
1927–28	Do.	IX	25	IX	Do.
1928–29	Do.	X	34	X	Do.
1929–30	Do.	XI	36	XI	Do.
	Do.	1	1		
	Do.	2	1		
	Do.	3	19		
	Do.	4	15		
	Do.	5	2		
	Do.	6	1		
	Do.	7	1		
	Do.	8	1		
	Do.	9	79		
	Do.	10	33		
	Do.	11	1		
	Do.	12	2		
	Do.	13	2		
	Do.	14	2		
	Do.	15	2		
	Do.	16	38		
	Do.	17	3		
	Do.	18	4		
	Do.	19	232		
	Do.	20	4		
	Do.	21	1		
	Do.	22	1		
	Do.	23	9		
	Do.	24	2		
	Do.	25	21		
	Do.	26	5		
	Do.	27	9		
	Do.	28	219		
	Do.	29	2		
	Do.	30	23		
	Do.	31	138		
	Do.	32	1		
	Do.	33	1		
	Do.	34	6		
	Do.	35	4		
	Do.	36	41		

	Sal. acs.	Non-Sal. acs.	Total. acs.
Worked coupes	421	11	432
Unworked compartments	926	..	926
Total	1,347	11	1,358

Annual coupe = 1,347 ÷ 40 = 34 acres.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—**cont.**

19. *Sollundi Series* (*Buguda Range*).

Year.	Reserve.	Coupe or Compart-ment number.	Area—Sal. / Total.	Old Series. Coupe number.	Old Series. Name of Series.
1911–12 ..	Sollundi	I	32/34	I	Sollundi.
1912–13 ..	Do.	II a	39	II	Do.
	Budrungu	b	35/46	I	Do.
1913–14 ..	Sollundi	III	33/40	III	Do.
1914–15 ..	Do.	IV a	32/36	IV	Do.
	Budrungu	b	26/36	II	Do.
1915–16 ..	Sollundi	V	33/42	V	Do.
1916–17 ..	Do.	VI a	46	VI	Do.
	Budrungu	b	26	III	Do.
1917–18 ..	Sollundi	VII a	44	VII	Do.
	Budrungu	b	26	IV	Do.
1918–19 ..	Sollundi	VIII a	54	VIII	Do.
	Budrungu	b	22/25	V	Do.
	Do.	c	10	V a	Do.
1919–20 ..	Sollundi	IX	62	IX	Do.
1920–21 ..	Do.	X	47	X	Do.
1921–22 ..	Do.	XI	48/49	XI	Do.
1922–23 ..	Do.	XII	41/46	XII	Do.
1923–24 ..	Nagari	XIII	43/45	XIII	Do.
1924–25 ..	Do.	XIV	53/58	XIV	Do.
1925–26 ..	Sollundi	XV	43/46	XV	Do.
1926–27 ..	Nagari	XVI	15/56	XVI	Do.
1927–28 ..	Do.	XVII	28/75	XVII	Do.
1928–29 ..	Do.	XVIII	14/73	XVIII	Do.
1929–30 ..	Do.	XIX	28/36	XIX	Do.
	Do.	1	47		
	Do.	2	9		
	Do.	3	4		
	Do.	4	1		
	Do.	5	25		
	Do.	6	14		
	Do.	7	4		
	Do.	8	2		
	Do.	9	2		
	Do.	10	5		
	Do.	11	4		
	Do.	12	11		
	Do.	13	3		
	Sollundi	1	4		
	Do.	2	17		
	Do.	3	16		
	Do.	4	24		
	Do.	5	4		
	Do.	6	1		
	Do.	7	1		
	Do.	8	2		

PLAINS SAL POLE WORKING CIRCLE—*cont.*

***List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres*—cont.**

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series
	19. *Sollundi Series* (*Buguda Range*)—cont.				
	Sollundi	9	2		
	Do.	10	5		
	Do.	11	18		
	Do.	12	2		
	Do.	13	11		
	Do.	14	5		
	Do.	15	2		
	Budrungu	1	25		
	Do.	2	56		
	Do.	3	18		
	Do.	4	9		
	Do.	5	2		
	Do.	6	2		
	Do.	7	3		
	Do.	8	6		
	Do.	9	2		
	Do.	10	1		
	Do.	11	6		
	Do.	12	9	..	
	Do.	13	8		
	Do.	14	3		
	Do.	15	13		
	Do.	16	2		
	Kaddapada	1	109		
	Do.	2	2		
	Do.	3	2		
	Do.	4	67		
	Do.	5	92		
	Do.	6	2		
	Do.	7	107		
	Do.	8	2		
	Chamunda	1	3		
	Do.	2	45		
	Do.	3	2		
	Do.	4	6		
	Do.	5	43		
	Do.	6	2		
	Do.	7	33		

	Sal. ACS.	Non-Sal. ACS.	Total. ACS.
Worked coupes	880	217	1,097
Unworked compartments ..	917	..	917
Total ..	1,797	217	2,014

Annual coupe = 1,797 ÷ 40 = 45 acres.

20. *Latipada Series* (*Surada and Russellkonda Ranges*).

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series
1910–11 ..	Dumu Dumi	I	36 — 65	I	Dumu Dumi.
1911–12 ..	Do.	II	29 — 55	II	Do.
1913–14 ..	Do.	III	11 — 26	IV	Do.
1914–15 ..	Do.	IV a	8 — 55	V	Do.
	Malati	b	4 — 20	IV	Malati.
1916–17 ..	Dumu Dumi	V a	17 — 21	VI	Dumu Dumi.
	Malati	b	35 — 87	V & VI	Malati
1917–18 ..	Vinjigiri	VI a	27 — 38	I	Latipada.
	Do.	b	43 29	I a	Do.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—**cont.**

20. *Latipada Series* (*Surada and Russellkonda Ranges*)—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
1917–18	Dumu Dumi	c	29/41	VII	Dumu Dumi.
	Malati	d	20/54	VII	Malati.
1918–19 ..	Vinjigiri	VII a	13/36	II	Latipada.
	Dumu Dumi	b	23/54	VIII	Dumu Dumi.
	Malati	c	27/38	VIII	Malati.
1919–20 ..	Dumu Dumi	VIII a	19	IX	Dumu Dumi.
	Malati	b	10/13	IX	Malati.
	Do.	c	10/20	IX	Do.
1920–21 ..	Dumu Dumi	IX a	35/37	X	Dumu Dumi.
	Malati	b	14	X	Malati.
1921–22 ..	Vinjigiri	X a	62/65	IV	Latipada.
	Dumu Dumi	b	29/32	XI	Dumu Dumi.
	Malati	c	19/23	XI	Malati.
1922–23 ..	Vinjigiri	XI a	16/18	V	Latipada.
	Do.	b	22	V	Do.
	Dumu Dumi	c	26/29	XII	Dumu Dumi.
	Malati	d	10/16	XII	Malati.
1923–24 ..	Vinjigiri	XII a	36/38	VI	Latipada.
	Dumu Dumi	b	36/38	XIII	Dumu Dumi.
	Malati	c	11/15	XIII	Malati.
1924–25 ..	Dumu Dumi	XIII a	27/33	XIV	Dumu Dumi.
	Malati	b	3/34	XIV	Malati.
1925–26 ..	Vinjigiri	XIV a	19/33	VII	Latipada.
	Dumu Dumi	b	19/27	XV	Dumu Dumi.
1926–27 ..	Vinjigiri	XV a	14/30	VIII	Latipada.
	Do.	b	25/30	IX part.	Do.
	Dumu Dumi	c	32/34	XVI	Dumu Dumi.
1927–28 ..	Do.	XVI	10	XVII	Do.
1928–29 ..	Do.	XVII	20/28	XVIII	Do.
1929–30 ..	Do.	XVIII	25/30	XIX	Do.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. *Total area*—35,009 *acres*—cont.

20. *Latipada Series* (*Surada and Russellkonda Ranges*)—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	Vinjigiri	1	1		
	Do.	2	5		
	Do.	3	2		
	Do.	4	7		
	Do.	5	2		
	Do.	6	1		
	Do.	7	4		
	Do.	8	30		
	Do.	9	6		
	Do.	10	2		
	Do.	11	1		
	Do.	12	17		
	Do.	13	71		
	Do.	14	3		
	Do.	15	5		
	Do.	16	11		
	Do.	17	1		
	Do.	18	10		
	Do.	19	2		
	Do.	20	8		
	Do.	21	3		
	Do.	22	13		
	Do.	23	7		
	Do.	24	4		
	Do.	25	1		
	Do.	26	7		
	Dumu Dumi	1	3		
	Do.	2	14		
	Do.	3	57		
	Do.	4	9		
	Do.	5	15		
	Do.	6	48		
	Do.	7	2		
	Do.	8	2		
	Do.	9	2		
	Do.	10	3		
	Do.	11	2		
	Do.	12	6		
	Do.	13	1		
	Do.	14	1		
	Do.	15	4		
	Do.	16	12		
	Do.	17	12		
	Do.	18	1		
	Do.	19	3		
	Do.	20	2		
	Do.	21	8		
	Do.	22	10		

	Sal.	Non-Sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	871	450	1,321
Unworked compartments ..	441	..	441
Total ..	1,312	450	1,762

Annual coupe = 1,312 ÷ 40 = 33 acres.

21. *Rogoda Series* (*Surada Range*).

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
1916–17 ..	Rogoda	I	18	I	Kaliaguda.
1917–18 ..	Do.	II a	20/25	II a	Do
	Do.	b	7/8	b	Do.
1918–19 ..	Do.	III a	125/144	I	Latipada.
	Do.	b	42/64	III	Kaliaguda.

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	21. *Rogoda Series* (*Surada Range*)—cont.				
1919–20	Rogoda	IV a	32	II a	Latipada.
			40		
		b	18	b	Do.
		c	28	IV	Kaliaguda.
			30		
1920–21	Do.	V a	—	III	Latipada.
			53		
	Do.	b	23	V	Kaliaguda.
1921–22	Do.	VI	26	VI	Do.
			—		
			27		
			30		
1922–23	Do.	VII a	—	VII	Do.
			41		
		b	15	V a	Latipada.
			26		
1923–24	Do.	VIII a	—	VIII	Kaliaguda.
			40		
	Do.	b	15	VI	Latipada.
1925–26	Do.	IX	24	IX	Kaliaguda.
1926–27	Do.	X a	18	IX part.	Latipada.
			22		
	Do.	b	—	X	Kaliaguda.
			26		
			42		
1927–28	Do.	IX a	—	X	Latipada.
			55		
	Do.	b	18	XI	Kaliaguda.
			41		
1928–29	Do.	XII a	—	XI	Latipada.
			56		
			6		
	Do.	b	—	XII	Kaliaguda.
			27		
1929–30	Do.	XIII a	38	XII	Latipada.
			29		
	Do.	b	—	XIII	Kaliaguda.
			35		
	Do.	1	2		
	Do.	2	14		
	Do.	3	5		
	Do.	4	1		
	Do.	5	2		
	Do.	6	4		
	Do.	7	24		
	Do.	8	2		
	Do.	9	4		
	Do.	10	5		
	Do.	11	27		
	Do.	12	2		
	Do.	13	17		
	Do.	14	12		
	Do.	15	4		
	Do.	16	3		
	Do.	17	1		
	Do.	18	9		
	Do.	19	2		
	Do.	20	4		
	Do.	21	2		
	Do.	22	3		
	Do.	23	1		
	Do.	24	2		
	Do.	25	1		
	Do.	26	2		
	Do.	27	45		
	Do.	28	44		
	Do.	29	5		
	Do.	30	9		
	Do.	31	92		
	Do.	32	5		
	Do.	33	66		
	Do.	34	4		
	Do.	35	2		
	Do.	36	23		
	Do.	37	1		
	Do.	38	1		
	Do.	39	220		
	Do.	40	1		

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		21. Rogoda Series (*Surada Range*)—cont.			
1929–30 ..	Rogoda	41	1		
	Do.	42	6		
	Do.	43	2		
	Do.	44	5		
	Do.	45	3		
	Do.	46	50		
	Do.	47	1		
	Do.	48	2		
	Do.	49	20		
	Do.	50	1		
	Do.	51	1		
	Do.	52	1		
	Do.	53	3		
	Do.	54	5		
	Do.	55	2		
	Do.	56	2		
	Do.	57	2		
	Do.	58	14		
	Do.	59	1		
	Do.	60	4		
	Do.	61	1		
	Do.	62	2		
	Do.	63	2		
	Do.	64	5		
	Do.	65	1		
	Do.	66	2		
	Do.	67	12		
	Do.	68	5		
	Do.	69	2		
	Do.	70	1		
	Do.	71	2		
	Do.	72	2		
	Do.	73	1		
	Do.	74	2		
	Do.	75	6		
	Do.	76	1		
	Do.	77	26		
	Do.	78	1		
	Do.	79	5		
	Do.	80	1		
	Do.	81	1		
	Do.	82	15		
	Do.	83	35		
	Do.	84	2		
	Do.	85	101		
	Do.	86	2		
	Do.	87	3		
	Do.	88	4		
	Do.	89	25		
	Do.	90	1		
	Do.	91	5		
	Do.	92	3		
	Do.	93	1		
	Do.	94	6		
	Do.	95	46		
	Do.	96	6		
	Do.	97	11		
	Do.	98	1		
	Do.	99	14		
	Do.	100	12		
	Do.	101	1		
	Do.	102	1		
	Do.	103	3		
	Do.	104	4		
	Do.	105	1		
	Do.	106	11		
	Do.	107	1		
	Do.	108	8		

	Sal.	Non-Sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	693	163	856
Unworked compartments	1,203	..	1,203
Total ..	1,896	163	2,059

Annual coupe = 1,896 ÷ 40 = 47 acres.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		22. *Surada Series* (*Surada Range*).			
1914–15	Raipada	I	12/28	I	Surada.
1915–16	Do.	II	39/90	I a, b	Do.
1916–17	Do.	III	23/34	II	Do.
1917–18	Do.	IV	28/32	III	Do.
1918–19	Do.	V	51/71	IV	Do.
1919–20	Do.	VI	34/36	V	Do.
1920–21	Do.	VII a	11/16	VI	Do.
	Hukuma	b	22/24	I	Do.
1922–23	Raipada	VIII a	6/22	VII	Do.
	Hukuma	b	17/30	II	Do.
	Do.	c	6/29	II a	Do.
1923–24	Raipada	IX a	15/31	VIII	Do.
	Hukuma	b	29/36	III	Do.
1924–25	Raipada	X a	6/18	IX	Do.
	Hukuma	b	10	IV a	Do.
	Do.	c	3/20	IV	Do.
1925–26	Raipada	XI a	26/27	X	Do.
	Hukuma	b	20	V	Do.
1926–27	Raipada	XII a	23	XI	Do.
	Hukuma	b	18/36	VI	Do.
	Bondagocha	c	23	I	Do.
1927–28	Raipada	XIII a	25/26	XII	Do.
	Bondagocha	b	26	II	Do.
1928–29	Raipada	XIV a	2/48	XIII	Do.
	Hukuma	b	14/61	VII & VIII	Do.
1929–30	Do.	XV	13	IX	Do.
	Do.	1	2		
	Do.	2	12		
	Do.	3	1		
	Do.	4	2		
	Do.	5	6		
	Do.	6	4		
	Do.	7	4		
	Do.	8	1		
	Do.	9	2		
	Do.	10	6		
	Do.	11	2		
	Do.	12	22		
	Do.	13	1		

PLAINS SAL POLE WORKING CIRCLE—*cont.*

*List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—*cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
		22. *Surada Series (Surada Range)*—cont.			
1929–30 ..	Hukuma	14	8		
	Do.	15	4		
	Do.	16	19		
	Do.	17	1		
	Do.	18	5		
	Do.	19	5		
	Do.	20	4		
	Do.	21	3		
	Do.	22	1		
	Do. ..	23	10		
	Do.	24	1		
	Do.	25	1		
	Do.	26	38		
	Do.	27	1		
	Do.	28	6		
	Do.	29	2		
	Do.	30	3		
	Do.	31	9		
	Do.	32	2		
	Do.	33	17		
	Do.	34	1		
	Raipada	1	2		
	Do.	2	2		
	Do.	3	1		
	Do.	4	1		
	Do.	5	2		
	Do.	6	2		
	Do.	7	1		
	Do.	8	2		
	Do. ..	9	2		
	Do.	10	3		
	Do.	11	18		
	Do.	12	9		
	Do.	13	3		
	Do.	14	20		
	Do.	15	1		
	Do.	16	1		
	Do.	17	1		
	Do.	18	2		
	Do.	19	15		
	Do.	20	2		
	Do.	21	2		
	Do.	22	2		
	Do.	23	4		
	Do.	24	2		
	Do.	25	5		
	Do.	26	1		
	Do.	27	10		
	Do.	28	2		
	Do.	29	5		
	Bondagocha	1	1		
	Do.	2	22		
	Do.	3	7		
	Do.	4	3		
	Do.	5	1		
	Do.	6	2		
	Do.	7	13		
	Do.	8	4		
	Do.	9	56		
	Do.	10	2		
	Do.	11	2		
	Do.	12	8		
	Do.	13	6		
	Do.	14	4		
	Do.	15	1		
	Do.	16	1		
	Do.	17	10		
	Do.	18	12		
	Do.	19	8		

	Sal.	Non-Sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	502	328	830
Unworked compartments	492	..	492
Total ..	994	328	1,392

Annual coupe = 994 ÷ 40 = 25 acres.

Plains Sal Pole Working Circle—*cont.*

List of Coupes and Compartments allotted to Felling Series. Total area—35,009 acres—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	23. Osurobandho Series (Surada and Pondakhol Ranges).				
1917–18	Mundapitta	I a	35/40	I	Osurobandho.
	Dhowgam	b	66	I	Do.
1918–19	Mundapitta	II a	26/48	II	Do.
	Dhowgham	b	60/66	II	Do.
1919–20	Mundapitta	III	12	III	Do.
1920–21	Do.	IV a	8	IV	Do.
	Do.	b	7/8	IV	Do.
1921–22	Do.	V	12/22	V	Do.
1922–23	Do.	VI a	11/12	VI	Do.
	Do.	b	6	VI a	Do.
1923–24	Do.	VII	15	VII	Do.
1924–25	Do.	VIII	6/12	VIII	Do.
1925–26	Do.	IX	15/16	IX	Do.
1926–27	Do.	X	8/15	X	Do.
1928–29	Do.	XI	8/15	XII	Do.
1929–30	Do.	XII	10	XIII	Do.
	Pippalaponka	1	6		
	Do.	2	13		
	Do.	3	7		
	Do.	4	97		
	Do.	5	18		
	Do.	6	10		
	Do.	7	30		
	Do.	8	5		
	Do.	9	5		
	Do.	10	10		
	Do.	11	36		
	Do.	12	109		
	Do.	13	58		
	Do.	14	8		
	Do.	15	6		
	Do.	16	21		
	Do.	17	8		
	Do.	18	2		
	Do.	19	3		
	Do.	20	3		
	Do.	21	14		
	Do.	22	1		
	Do.	23	57		
	Do.	24	2		
	Do.	25	3		
	Do.	26	105		
	Do.	27	14		
	Do.	28	3		
	Do.	29	20		
	Do.	30	11		
	Do.	31	3		
	Do.	32	7		
	Do.	33	45		
	Do.	34	6		
	Do.	35	6		
	Do.	36	27		
	Do.	37	2		
	Do.	38	5		
	Do.	39	3		
	Do.	40	10		
	Do.	41	36		

PLAINS SAL POLE WORKING CIRCLE—*cont.*

List of Coupes and Compartments allotted to Felling series. Total area—35,009 *acres*—cont.

Year.	Reserve.	Coupe or Compartment number.	Area—Sal. Total.	Old Series. Coupe number.	Old Series. Name of Series.
	23. *Osurobandho Series* (*Surada and Pondakhol Ranges*)—cont.				
1929–30	Pippalaponka	42	10		
	Do.	43	17		
	Do.	44	16		
	Do.	45	2		
	Do.	46	2		
	Do.	47	2		
	Do.	48	3		
	Do.	49	2		
	Do.	50	14		
	Do.	51	1		
	Do.	52	1		
	Do.	53	67		
	Do.	54	19		
	Do.	55	5		
	Mundapitta	1	2		
	Do.	2	2		
	Do.	3	1		
	Do.	4	2		
	Do.	5	1		
	Do.	6	1		
	Do.	7	2		
	Do.	8	14		
	Do.	9	2		
	Do.	10	1		
	Do.	11	1		
	Do.	12	1		
	Do.	13	2		
	Do.	14	16		
	Do.	15	4		
	Do.	16	5		
	Do.	17	5		
	Do.	18	2		
	Do.	19	2		
	Do.	20	1		
	Do.	21	2		
	Do.	22	7		
	Do.	23	5		
	Do.	24	7		
	Do.	25	1		
	Do.	26	8		
	Do.	27	17		
	Dheppaguda	1	1		
	Do.	2	2		
	Do.	3	4		
	Do.	4	1		
	Do.	5	2		
	Do.	6	10		
	Do.	7	1		
	Do.	8	5		
	Do.	9	2		
	Do.	10	1		
	Do.	11	3		
	Do.	12	1		
	Do.	13	6		
	Do.	14	2		
	Do.	15	1		
	Do.	16	9		
	Do.	17	3		
	Dhowgam	1	3		
	Do.	2	28		
	Do.	3	3		
	Do.	4	1		
	Do.	5	2		

	Sal.	Non-Sal.	Total.
	ACS.	ACS.	ACS.
Worked coupes	305	66	371
Unworked compartments	1,201	..	1,201
Total	1,506	66	1,572

Annual coupe = 1,506 ÷ 40 = 38 acres.

Plains Sal Pole Working Circle—*cont.*

List of Compartments not allotted to Felling Series. Total area—5,777 acres.

Range.	Reserve.	Compartment.	Area.
			ACS.
Russellkonda ..	Baiballi ..	12	34
	Do. ..	13	1
	Do. ..	14	1
	Do. ..	15	3
	Do. ..	16	2
	Do. ..	17	18
	Do. ..	18	2
	Do. ..	19	42
	Do. ..	20	5
	Do. ..	21	254
	Do. ..	22	12
	Do. ..	23	12
	Do. ..	24	1
	Do. ..	25	1
	Do. ..	26	1
	Do. ..	27	1
	Do. ..	28	73
	Do. ..	29	142
	Do. ..	30	12
	Do. ..	31	3
	Do. ..	32	2
	Do. ..	33	165
	Do. ..	34	80
	Do. ..	35	2
	Do. ..	36	2
	Do. ..	37	9
	Do. ..	38	1
	Do. ..	39	7
	Do. ..	40	6
	Do. ..	41	3
	Do. ..	42	58
	Do. ..	43	30
	Do. ..	44	4
	Do. ..	45	1
	Do. ..	46	2
	Do. ..	47	4
	Do. ..	48	110
	Do. ..	49	13
	Do. ..	50	1
		Total ..	1,120
Mojjagoda ..	Darpangia ..	1	126
	Do. ..	2	4
	Do. ..	3	79
	Do. ..	4	56
	Do. ..	5	105
	Do. ..	6	1
	Do. ..	7	26
	Do. ..	8	2
	Do. ..	9	16
	Do. ..	10	2
	Do. ..	11	1
	Do. ..	12	3
	Do. ..	13	58
	Do. ..	14	78
	Do. ..	15	6
	Do. ..	16	49
	Do. ..	17	158
	Do. ..	18	13
	Do. ..	19	7
	Do. ..	20	2
Mojjagoda—*cont.*	Darpangia ..	21	452
	Do. ..	22	40
		Total ..	1,284
	Rambha ..	1	75
	Do. ..	2	18
	Do. ..	3	1
		Total ..	94
Kukuluba ..	Ambazora ..	1	12
	Do. ..	2	117
	Do. ..	3	94
	Do. ..	4	8
	Do. ..	5	20
	Do. ..	6	1,152
	Do. ..	7	18
	Do. ..	8	6
	Do. ..	9	8
		Total ..	1,435
	Gundribadi ..	1	1,183
	Do. ..	2	50
	Do. ..	3	152
	Do. ..	4	8
		Total ..	1,393
Bontha ..	Paichalia ..	1	19
	Do. ..	2	93
		Total ..	112
	Gogodo ..	1	4
	Do. ..	2	38
	Do. ..	3	4
	Do. ..	4	2
	Do. ..	5	127
	Do. ..	6	7
	Do. ..	7	41
	Do. ..	8	70
	Do. ..	9	4
	Do. ..	10	2
	Do. ..	11	4
	Do. ..	12	11
	Do. ..	13	9
	Do. ..	14	3
	Do. ..	15	9
		Total ..	335
Pondakhol ..	Pondakhol (Ponkalagam block).	1	3
	Do.	2	1
		Total ..	4

APPENDIX VIII.

Fuel Working Circle.

List of Worked Coupes allotted to Felling Series.

Year.	Reserve.	Coupe number.	Area.	Old Series. Coupe number.	Old Series. Name of Series.
			ACS.		
		1. *Malati Series* (*Russellkonda Range*).			
1909–10 ..	Malati	I	46	I	Malati of Pole Working Circle.
1910–11 ..	Do.	II	20	II	Do.
1914–15 ..	Do.	III	34	III	Do.
1925–26 ..	Do.	IV	56	XV	Malati of Fuel Working Circle.
1926–27 ..	Do.	V	41	XVI	Do.
1927–28 ..	Do.	VI	113	XVII	Do.
1928–29 ..	Do.	VII	53	XVIII	Do.
1929–30 ..	Do.	VIII	51	XIX	Do.
		Total ..	414		
		2. *Kontaipalli Series* (*Russellkonda Range*).			
1926–27 ..	Kaliamba	I	33	I	Kontaipalli.
1928–29 ..	Do.	II	35	II	Do.
1929–30 ..	Do.	III	49	III	Do.
		Total ..	117		
		3. *Gundribadi Series* (*Russellkonda Range*).			
1928–29 ..	Tiliki	I	57	I	Gundribadi.
1929–30 ..	Do.	II a	35	II a	Do.
		b	8	b	Do.
		Total ..	100		
		4. *Kullada Series* (*Russellkonda Range*).			
1926–27 ..	Kullada	I	24	I	Kullada.
1927–28 ..	Do.	II	31	II	Do.
1928–29 ..	Do.	III	35	III	Do.
1929–30 ..	Do.	IV	30	IV	Do.
		Total ..	120		
		5. *Kumarosuni East Series* (*Russellkonda Range*).			
1912–13 ..	Kumarosuni	I a	16	I	Bojrogodo.
	Do.	b	30	I	No name.
1913–14 ..	Do.	II a	25	II	Bojrogodo.
	Do.	b	16	II	No name..
1914–15 ..	Do.	III a	28	III	Bojrogodo.
	Do.	b	85	III	No name.
1915–16 ..	Do.	IV a	28	IV	Bojrogodo.
	Do.	b	24	IV	No name.
1917–18 ..	Do.	V	23	V	Bojrogodo.
1918–19 ..	Do.	VI	27	VI	Do.
1920–21 ..	Do.	VII	25	VII	Do.
1921–22 ..	Do.	VIII	32	VIII	Do.
1922–23 ..	Do.	IX	40	IX	Do.
1923–24 ..	Do.	X	36	X	Do.
		Total ..	435		
		6. *Kumarosuni West Series* (*Russellkonda Range*).			
1924–25 ..	Kumarosuni	I	48	XI	Bojrogodo.
1925–26 ..	Do.	II	44	XII	Do.
1926–27 ..	Do.	III	56	XIII	Do.
1927–28 ..	Do.	IV	77	XIV	Do.
1928–29 ..	Do.	V	79	XV	Do.
1929–30 ..	Do.	VI	32	XVI	Do.
		Total ..	336		
		7. *Binodia Series* (*Russellkonda Range*).			
1926–27 ..	Binodia	I	23	I	Binodia.
1927–28 ..	Do.	II	34	II	Do.
1928–29 ..	Do.	III	40	III	Do.
1929–30 ..	Do.	IV	45	IV	Do.
		Total ..	142		

Fuel Working Circle—*cont.*

List of Worked Coupes allotted to felling series—cont.

Year.	Reserve.	Coupe number.	Area.	Old series. Coupe number.	Old series. Name of series.
			ACS.		
		8. Tangarai East Series (Russellkonda Range).			
1921–22	Tangarai	I	32	VI	Tangarai.
1922–23	Do.	II	31	VII	Do.
1923–24	Do.	III	30	VIII	Do.
1924–25	Do.	IV	49	IX	Do.
1925–26	Do.	V	54	X	Do.
1926–27	Do.	VI	44	XI	Do.
1929–30	Do.	VII	4	XIV b	Do.
		Total	244		
		9. Tangarai West Series (Russellkonda Range).			
1912–13	Tangarai	I	30	I	Tangarai.
1913–14	Do.	II	30	II	Do.
1917–18	Do.	III	28	III	Do.
1918–19	Do.	IV	24	IV	Do.
1920–21	Do.	V	30	V	Do.
1927–28	Do.	VI	73	XII	Do.
1928–29	Do.	VII	40	XIII	Do.
1929–30	Do.	VIII	65	XIV a	Do.
		Total	320		
		10. Sondasolia East Series (Russellkonda Range).			
1918–19	Sondasolia	I	31	I	Sondasolia north.
1922–23	Do.	II	27	II	Do.
1923–24	Do.	III	31	III	Do.
1924–25	Do.	IV	47	IV	Do.
1925–26	Do.	V	59	V	Do.
1926–27	Do.	VI	36	VI	Do.
1927–28	Do.	VII a	28	VII	Do.
	Do.	b	29	XI	Sondasolia south.
1928–29	Do.	VIII a	32	VIII	Sondasolia north.
	Do.	b	35	XII	Sondasolia south.
1929–30	Do.	IX a	26	IX	Sondasolia north.
	Do.	b	36	XIII	Sondasolia south.
		Total	417		
		11. Sondasolia West Series (Russellkonda Range).			
1912–13	Sondasolia	I	32	I	Sondasolia south.
1913–14	Do.	II	32	II	Do.
1914–15	Do.	III	26	III	Do.
1918–19	Do.	IV	27	IV	Do.
1920–21	Do.	V	48	V	Do.
1921–22	Do.	VI	36	VI	Do.
1922–23	Do.	VII	31	VII	Do.
1923–24	Do.	VIII	31	VIII	Do.
1924–25	Do.	IX	38	IX	Do.
1926–27	Do.	X	69	X	Do.
		Total	370		
		12. Jaganadprasad Series (Bontha Range).			
1929–30	Jaganadprasad	I	58	I	Jaganadprasad.
		Total	58		
		13. Kriamba Series (Buguda Range).			
1929–20	Kriamba	I	38	I	Kriamba.
		Total	38		
		14. Kuddapada Series (Buguda Range).			
1929–30	Kuddapada	I	42	I	Kuddapada.
		Total	42		

15. *Jhankarai Series(Buguda Range).*

New felling series proposed in Kurcholi A reserve from 1930–31.

311, For.—31

APPENDIX IX.

CONTROL BOOK.

Plains Sal Timber Working Circle.

Prescriptions of working plan.							Result of operations.													
	Locality to be exploited.							Locality exploited.						Revenue.	Details of actual yield.					Remarks.
Year of felling.	Range.	Reserve.	Block.	Coupe.	Com-part-ment.	Area.	Year of felling.	Range.	Reserve.	Block.	Coupe.	Com-part-ment.	Area.		Species.	Timber.	Poles.	Fuel.	Bam-boos.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
						ACS.							ACS.	RS.		C. FT.	C. FT.	C. FT.	NO.	
			Felling Series I.										*Felling Series I.*							
1930–31 ..	Mojjagoda.	Galleri ..	Miniari Kutni-kuppa.	XII-a	27	125	1930–31 ..	Mojjagoda	Galleri ..	Miniari Kutni-kuppa.	XII-a	27	112		Sal ..	20,500	15,275	10,200	..	*
				b	17	42					b	17	40		Other spe-cies ..	7,200	3,400			
															Bamboos ..	..	..	10,200	500	
				Total ..		167							152	9,122	Total ..	27,700	18,675	10,200	500	
			Felling Series II.										*Felling Series II.*							
	Buguda ..	Kriamba	Thalasoro.	XII-a	2	32		Buguda ..	Kriamba.	Thalasoro.	XII-a	2	36		Sal ..	5,500	2,420	5,930	..	†
				b	3	4					b	3	3		Other spe-cies.	1,140	2,800			
				c	4	2					c	4	10		Bamboos.	..	..	..	..	
				Total ..		38							49	2,450 at Rs. 50 per acre.	Total ..	6,640	5,220	5,930	..	

* Actual survey gave area of 152 acres. Coupe was worked departmentally.
† Actual survey gave area of 49 acres. Coupe was sold standing to a contractor.

Ravine Working Circle.

Prescriptions of working plan.						Result of operations.												
	Locality to be exploited.						Locality exploited.					Revenue	Details of actual yield.					Remarks.
Year of felling.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.	Year of felling.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.		Species.	Timber.	Poles.	Fuel.	Bamboos.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
					ACS.						ACS.	RS.		C. FT.	C. FT.	C. FT.	NO.	
		Felling Series I.										*Felling Series I.*						
1930–31 ..	Mojjagoda	Rambha ..	IX	2	55	1930–31 ..	Mojjagoda	Rambha ..	IX	2	96	1,248 at Rs. 13 per acre.	Sal ..	5,250	1,500	2,700		*
													Other spe-cies.	2,500	400		..	
													Bamboos.	..	..	..	2,000	
													Total ..	7,750	1,900	2,700	2,000	
		Felling Series II.										*Felling Series II.*						
	Buguda ..	Kriamba	I	2 (part)	24		Buguda ..	Kriamba	I	2 (part).	18	315 at Rs. 17–8–0 per acre.	Sal ..	2,000	500	1,250		†
													Other spe-cies.	1,250	100			
													Bamboos..	..	..	..	..	
													Total ..	3,250	600	1,250	Nil.	

†* Actual survey gave area of 96 acres. Coupe sold standing to a contractor.
18 acres sold standing to a contractor.

Control Book—*cont.*

Plains Sal Pole Working Circle.

Prescriptions of working plan.							Result of operations.												
	Locality to be exploited.							Locality exploited.							Details of actual yield.				
Year of felling.	Felling series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.	Year of felling.	Felling series.	Range.	Reserve.	Coupe.	Com-part-ment.	Area.	Revenue realized.	Timber.	Poles.	Fuel.	Bam-boos.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
						ACS.							ACS.	RS.	C. FT.	C. FT.	C. FT.	NO.	
1930-31 ..	Kontaipalli	Russell-konda.	Kaliamba.	XXVII	3 (part).	31	1930-31.	Kontaipalli	Russell-konda.	Kaliamba .	XXVII	3 (part).	34	1,292	1,700	2,720	10,200	..	
	Bankanedi	Do.	Do. ..	IX	28 (part).	34		Bankanedi.	Do.	Tiliki ..	XXII	28 part).	36	1,080	1,800	2,885	10,800	..	
	Gundribadi	Do.	Tiliki ..	XXIV	1 (part).	34		Gundribadi	Do.	Tiliki ..	XXII	1 (part).	43	1,333	2,150	3,442	12,910	..	
	Hathiguda	Do.	Baiballi ..	III	3 (part).	45		Hathiguda	Do.	Baiballi ..	III	3 (part).	35	595	1,755	2,800	10,520	500	
	Kullada ..	Do.	Kullada ..	XXVI	1 (part).	22		Kullada ..	Do.	Kullada ..	XXVI	1 (part).	23	207	1,150	1,843	6,905	..	
	Siddapoda-ro.	Mojjagoda.	Galleri ..	VIII	10 (part).	52		Siddapoda-ro.	Mojjagoda.	Galleri ..	VIII	10 (part).	46	1,426	2,308	3,480	13,808	850	

Selection Working Circle.

Prescriptions of working plan.						Result of operations.										
	Locality to be exploited.						Locality exploited.					Details of actual yield.				
Year of felling.	Felling series.	Range.	Reserve.	Coupe.	Area.	Year of felling.	Felling series.	Range.	Reserve.	Coupe.	Area.	Species.	Number of trees felled.	Volume.	Revenue obtained.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
					ACS.						ACS.		NO.	C. FT.	RS.	
1930-31 ..	Russellkonda	Russellkonda.	Baiballi	I	2,165	1930-31. ..	Russellkonda.	Russellkonda.	Baiballi ..	I	2,165	Sal	92	2,523	..	
												Adina Cordifolia.	19	522	..	
												Diospyros melanoxylon ..	8	232	..	
												Terminalia tomentosa ..	55	1,369	..	
												Pterocarpus marsupium ..	1	19	..	
												Stephegyne par-vifolia	7	157	..	
												Anogeisous lati-folia	2	32		
												Total ..	184	4,854	**Rs. 1,290 at Re. 0-4-3 per cubic foot.**	

CONTROL BOOK—*cont.*

Fuel Working Circle.

1930–31.

Year of felling.	Prescriptions of the working plan. Locality to be exploited. Range.	Felling series.	Reserve.	Coupe.	Area.	Excess or deficit brought forward [from column (17) of last year's form].	Area available for exploitation in the year column (6) + column (7).	Year of felling.	Result of operations. Locality exploited. Range.	Felling series.	Reserve.	Coupe.	Area.	Revenue realized.	Actual yield.	Excess or deficit carried over [to column (7) of next year column (8) — column (14)].	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
					ACS.		ACS.						ACS.	RS.		ACS.	
1930–31 (Revised Working Plan Para. 355).	Russellkonda.	Malati ..	Malati ..	IX	50	..	50	1930–31 ..	Russellkonda.	Malati ..	Malati ..	IX	43	256	..	+ 7	@ Rs. 6 per acre.
	Do.	Kontaipalli ..	Kaliamba ..	IV	50	..	50		Do.	Kontaipalli ..	Kal amba ..	IV	47	446	..	+ 3	@ Rs. 9–8 per acre.
	Do.	Gundribadi ..	Tiliki ..	III	50	..	50		Do.	Gundribadi ..	Tiliki ..	III	37	601	..	+13	@ Rs. 16–4 per acre.
	Do.	Kullada ..	Kullada ..	V	30	..	30		Do.	Kullada ..	Kullada ..	V	29	65	..	+ 1	@ Rs. 2–4 per acre.
	Do.	Kumarasuni East.	Vishnuchakram.	XI	25	..	25		Not worked as no bid made C.O. to 1931–1932.							+25	
	Do.	Kumarasuni West.	Do.	VII	30	..	30		Do.	Kumarasuni West.	Vishnuchakram.	VII	24	60	..	+ 6	@ Rs. 2–8 per acre.
	Do.	Binodia ..	Do.	V	20	..	20		Do.	Binodia ..	Do.	V	22	198	..	— 2	@ Rs. 9 per acre.
	Do.	Thangarai East.	Do.	VIII	25	..	25		Do.	Tangarai East ..	Do.	VIII	26	266	..	— 1	@ Rs. 10–4 per acre.
	Do.	Tangarai West ..	Do.	IX	30	..	30		Do.	Tangarai West ..	Do.	IX	29	58	..	+ 1	@ Rs. 2 per acre.
	Do.	Sondosolia East.	Sondosolia ..	X	30	..	30		Do.	Sondasolia East.	Sondosolia ..	X	31	93	..	— 1	@ Rs. 3 per acre.
	Do.	Sondosolia West.	Do.	XI	25	..	25		Do.	Sondosolia West.	Do.	XI	25	87	..	..	@ Rs. 3–8 per acre.
	Bontha ..	Jagannadprasad	Jagannadprasad.	II	50	..	50		Bontha ..	Jagannadprasad.	Jagannadprasad.	II	51	166	..	— 1	@ Rs. 3–4 per acre.
	Buguda ..	Kriamba ..	Kriamba ..	II	40	..	40		Buguda ..	Kriamba ..	Kriamba ..	II	46	138	..	— 6	@ Rs. 3 per acre.
	Do. ..	Jhankarai ..	Kurcholli ..	I	30	..	30		Do. ..	Jhankarai ..	Kurcholi ..	I	30	90	..	..	Do.
	Do. ..	Kadapada ..	Kadapada ..	II	40	..	40		Do. ..	Kadapada ..	Kadapada ..	II	42	168	..	— 2	Do.
			Total ..		525		525						482	2,692	..	+43	@ Rs. 5–9–4 per acre average.

Arrears of 1930–31 brought forward.

1930–31 ..	Russellkonda ..	Kumarasuni East ..	Vishnuchakram	XI	..	25	25	1931–32
1931–32 (Revised working plan Paragraph 355).	Do. ..	Malati	Malati	X	50	+ 7	57	
	Do. ..	Kontaipalli	Kaliamba	V	50	+ 3	53	
	Do. ..	Gundribadi	Tiliki	IV	50	+13	63	
	Do. ..	Kullada	Kullada	VI	30	+ 1	31	
	Do. ..	Kumarasuni East ..	Vishnuchakram ..	XII	25	..	25	
	Do. ..	Kumarasuni West ..	Do.	VIII	30	+ 6	36	
	Do. ..	Binodia	Do.	VI	20	— 2	18	
	Do. ..	Tangarai East ..	Do.	IX	25	— 1	24	
	Do. ..	Tangarai West ..	Do.	X	30	+ 1	31	
	Do. ..	Sondosolia East ..	Sondosolia ..	XI	30	— 1	29	
	Do. ..	Sondosolia West ..	Do.	XII	25	..	25	
	Bontha ..	Jagannadprasad ..	Jagannadprasad ..	III	50	— 1	49	
	Buguda ..	Kriamba	Kriamba	III	40	— 6	34	
	Do. ..	Jhankarai	Korcholli	II	30	..	30	
	Do. ..	Kadapada	Kadapada	III	40	— 2	38	

CONTROL BOOK—*cont.*

Bamboo Working Circle.

Prescriptions of working plan.						Result of operations.								
Year of felling.	Locality to be exploited.					Year of felling.	Locality exploited.					Revenue realized.	Actual yield.	Remarks.
	Range.	Felling series.	Reserve.	Coupe.	Area.		Range.	Felling series.	Reserve.	Coupe.	Area.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
					ACS.						ACS.	RS. A. P.	NO.	
1930–31.	Russell-konda.	Kaliamba-Tiliki.	Kaliamba	I	3,493	1930–31.	Russell-konda.	Kaliamba-Tiliki.	Kaliamba.	I	3,493	390 0 0	117,000	
		Kullada ..	Kullada ..	I	645			Kullada ..	Kullada	I	645	90 0 0	28,200	
	Mojjagoda	Siddapoda-ro.	Galleri ..	I	794		Mojjagoda.	Siddapoda-ro.	Galleri ..	I	794	150 1 0	55,050	
		Rambha ..	Rambha ..	I	890			Rambha ..	Rambha ..	I	890	75 0 0	23,020	

Minor Produce Working Circle.

Prescriptions of working plan.		Result of operations.											
Year of working.	Collection and disposal of minor forest produce.	Year of working.	Produce leased.						Produce removed on permits.				Remarks.
			Range.	Kind of produce.	Period of lease.	Revenue.	Details of yield.		Range.	Kind of produce.	Quantity.	Revenue.	
							Produce.	Quantity.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
						RS. A. P.		QRS. OF 28 LB.			QRS. OF 28 LB.	RS. A. P.	
1929–30 ..	1. Lease of Rela (Cassia fistula) bark of Russellkonda range at the discretion of the District Forest Officer.	1929–30 ..	Russell-konda.	Rela bark.	1st July 1929 to 30th June 1930.	135 0 0	Rela bark.	3,500	..	..	..	..	
	2. Sale on permits of other produce such as fibre, chono grass, rough and cut stones, lime stone, etc.		..	..	..	..	..	..	Bontha ..	Rough stone.	5,250	10 0 0	
										Lime stone.	20,000	17 0 0	
									Buguda ..	Shiali fibre.	200	1 9 0	

CONTROL BOOK—*cont.*

Grazing Working Circle.

Prescriptions of working plan.			Result of operations					Number of animals.					
Year of working. (1)	Forests closed to grazing. (2)	Free grazing. (3)	Year of working. (4)	Range. (5)	Area closed to grazing. (6)	Area opened to grazing. (7)	Description of grazing. (8)	Buffaloes. (9)	Cows and bulls. (10)	Sheep. (11)	Total in cow units. (12)	Grazing revenue. (13)	Value of free grazing. (14)
					SQ. MILES.	SQ. MILES.						RS. A. P.	RS. A. P.
1930–31 ..	(1) Plains Sal Timber Working Circle.	(1) Kondhs of Chokkapad reserve allowed free grazing by right under settlement.	1930–31 ..	Mojjagoda.	11	164	(1) On payment ..	960	480	640	2,720	510 0 0	..
	(2) Demarcated sal blocks or other areas specially closed at the discretion of the District Forest Officer.	(2) Other Kondhs allowed free grazing as a concession subject to the limit of six head of cattle per house.	..	..	..	..	(2) By right under settlement.	100	200	..	400	..	75 0 0
	(3) Worked coupes of the Ravine and Plains Sal Pole Working Circles.	....	..	..	..	..	(3) During pleasure of Government as a concession.	500	750	100	1,300	..	243 12 0
	(4) Worked coupes of the Fuel Working Circle temporarily closed to grazing for five years from the date of felling.	....	..	..	..	..	..	..	..	..	..	..	..

Annual Summary of outturn by Working Circle.

Year. (1)	Working circle. (2)	Timber. (3)	Poles. (4)	Fuel. (5)	Bamboos. (6)	M.F.P. Value. (7)	Grazing. Revenue. (8)	Grazing. Value of free grants. (9)	Remarks. (10)
		C. FT.	C. FT.	C. FT.	NOS.	RS.	RS.	RS.	
1931–32	.. P. S. T. W. C.	34,340	23,895	16,130	500	..	..	..	
	Ravine W. C.	11,000	2,500	3,950	2,000	..	..	..	
	P. S. P. W. C.	10,863	17,170	65,143	1,350	..	..	..	
	Selection W. C.	4,500	..	..	..	..	..	..	
	Fuel W. C.	..	..	24,110	..	..	..	..	
	Bamboo W. C.	..	..	..	223,270	..	..	..	
	M. F. P. W. C.	..	..	..	..	164	..	..	
	Grazing W. C.	..	..	..	..	..	510	319	
	Total ..	60,703	43,565	109,333	227,120	164	510	319	

Annual Summary of Revenue.

(Vide Paragraph 410 of Part II.)

Year.	Revenue from — Plains Sal Timber Working Circle Clear fellings.		Ravine Working Circle Clear fellings.				Selection Working Circle Selection fellings.				Minor produce Working Circle.						Remarks.
	Felling Series I.	Felling Series II.	Felling Series I.	Felling Series II.	Plains Sal Pole Working Circle, Coppice fellings.	Thinnings from all Working Circles.	Sal.	Other Species.	Fuel Working Circle, Coppice fellings.	Bamboo Working Circle.	Lease of Cassia Fistula bark.	Sale of other produce on permits.	Grazing Working Circle.	Rents on buildings.	Other sources—Confiscated produce, fines and forfeitures, compounding fees, etc.	Total revenue in favour of Ghumsur forests.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	
1930–31	10,559	4,526	1,130	480	32,396	802	10,554	1,772	4,208	6,504	850	558	9,528	1,724	8,385	93,976	A revenue of Rs. 23,562 was obtained from the unreserves of Ghumsur.

NOTE.—Revenue realized from the Ghumsur forests only will be entered under the appropriate heads. Revenue obtained from the unreserves will be noted in the remarks column.

Annual Summary of Expenditure.

(Vide Paragraph 410 of Part II.)

Years.	Expenditure Ordinary under. Plains Sal Timber Working Circle.				Ravine Working Circle.					Plains Sal Pole Working Circle.	Selection Working Circle.	General.												Expenditure Capital.					
	Exploitation.	Regeneration.	Cleaning climber cutting and thinning.	Subsidiary tending.	Exploitation.	Regeneration.	Artificial regeneration	Weeding, cleaning climber cutting and thinning.	Subsidiary tending	Cleaning and thinning.	Exploitation.	Demarcation.	Fire protection.	Buildings.	Wells.	Roads and bridges.	Stores, tools and plants.	Pay of establishment.	Allowances T.A., F.C.A., F.T.A.	Commission to P.I. gumasthas.	Contingencies.	Miscellaneous.	Total.	Particulars.	Amount.	Interest at 5 per cent per annum on Capital expenditure.	Total expenditure to be charged against Ghumsur forests, columns (24) and (27).	Surplus or deficit.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
		RS.	RS.	RS.		RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.		RS.	RS.	RS.	RS.	
1930–31 ..	..	742	1,720	144	..	268	356	649	92	1,610	2,325	248	6,453	6,115	196	2,006	242	48,528	13,305	296	3,460	1,258	90,013	Demarcation.	252				
																								Buildings ..	1,206				
																								Wells ..	182				
																								Roads and bridges.	1,025				
																								Stores, tools and plant	345				
																								Total ..	3,010	151	90,164	+ 3,812	

NOTE.—The expenditure relating to the Ghumsur Forests is to be calculated in accordance with the procedure laid down in Chapters XI and XII of Part II.

Record of Works

Plains Sal Timbber Working Circle.

Prescriptions of Working Plan.							Result of operations.										
Year of working.	Range.	Reserve.	Block.	Coupe or compartment.	Area.	Nature of operation.	Year of working.	Range.	Reserve.	Block.	Coupe or compartment.	Area.	Nature of work done.	Cost.	Yield.	Revenue.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
					ACS.							ACS.		RS.			
FELLING SERIES I.																	
1930–31 ..	Mojjagoda.	Galleri ..	Miniari ..	XII-a 30–31	112		1930–31	Mojjagoda.	Galleri ..	Miniari ..	XII-a 30–31	112					
			Kutnikup-pa.	b	40					Kutnikup-pa.	b	40	Heaping and burning. Cutting back sal advance growth. February-March 1931.	608	..	..	
					152	Natural Regeneration.						152					
			Miniari ..	X 28–29	138	Second year cleaning.				Miniari ..	X 28–29	138	Second year cleaning. October-November 1930.	345	..	..	
FELLING SERIES II.																	
(a) *Measures prescribed.*																	
	Buguda ..	Kriamba.	Thalasoro.	XI a 29–30	22			Buguda ..	Kriamba.	Thalasoro.	XI a 29–30	22					
				b	10						b	10					
					32	First year cleaning.						32	First year cleaning. October 1930.	72	..	..	
(b) *Measures Suggested.*																	
	Buguda ..	Kriamba.	Kriamba.	VI 24–25 (part).	8	Cutting bamboo regrowth.		Buguda ..	Kriamba .	Kriamba.	VI 24–25 (part).	8	Cutting bamboo regrowth. November 1930.	8	..	..	
(c) *Measures neither prescribed nor suggested but carried out.*																	
								Buguda ..	Kriamba.	Thalasoro.	X d 28–29 (part).	5	Cutting back burnt area. June 1930.	5	..	..	The area was burnt in May 1930 by an accidental fire.

RECORD OF WORKS—*cont.*

Ravine Working Circle.

Prescription of Working Plan.						Result of operations.									
Year of working.	Range.	Reserve.	Coupe or compartment.	Area.	Nature of operation.	Year.	Range.	Reserve.	Coupe or compartment.	Area.	Nature of work done.	Cost.	Yield.	Revenue.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
				ACS.						ACS.		RS.	C. FT.	RS.	
						FELLING SERIES I.									
						(a) Measures prescribed.									
1930–31 ..	Mojjagoda ..	Rambha ..	IX 30–31	96	Natural regeneration.	1930–31	Mojjagoda ..	Rambha ..	IX 30–31	96	Heaping and burning. Cutting back sal advance growth. February-March 1931.	384			
			VIII-a 29–30	40					VIII-a 29–30	40					
			b	74					b	74					
				114						114	First year cleaning. October-November 1930.	290	..	..	
						(b) Measures neither prescribed nor suggested but carried out.									
							Mojjagoda ..	Rambha ..	VII 28–29 (part).	22	Cutting back burnt area. June 1930.	22	..	..	In May 1930 an accidental fire burnt 22 acres of the coupe.
						FELLING SERIES II.									
	Buguda ..	Kriamba ..	I 30–31	18	Natural regeneration.		Buguda ..	Kriamba ..	I 30–31	18	Heaping and burning. Cutting back sal advance growth. February 1931.	72	..	..	

Record of Works—*cont.*

Plains Sal Pole Working Circle.

Note :—In the case of coupes worked prior to 1930—31 the sal bearing area is indicated by the numerator and the total area by the denominator of a fraction wherever Sal and Non-Sal have been separately distinguished.

Prescriptions of Working Plan.							Result of operations.										
Year of working. (1)	Felling Series. (2)	Range. (3)	Reserve. (4)	Coupe. (5)	Area *Sal Total. (6)	Nature of operation. (7)	Year of working. (8)	Felling Series. (9)	Range. (10)	Reserve. (11)	Coupe. (12)	Area *Sal. Total. (13)	Nature of work done. (14)	Cost. (15)	Yield. (16)	Revenue. (17)	Remarks. (18)
					ACS.							ACS.		RS. A. P.	C. FT.		
1930–31 ..	Kontaipalli.	Russell-konda.	Kaliamba.	XXII-a 25–26.	48		1930–31	Kontaipalli.	Russell-konda.	Kaliamba.	XXIII-a 25–26.	48					
				b	5						b	5					
					53	Third year cleaning.						53	Third year cleaning	53 0 0	..	..	
	..	..	..	XII 15–16	40	15th year thinning.		..	..	..	XII 15–16	40	15th year thinning.	50 0 0	8,000	100	
	Bankanedi.	Do.	Do.	IV 25–26.	59	Third year cleaning.		Bankanedi.	Do.	Do.	IV 25–26.	59	Third year cleaning.	71 4 0	..	..	
	Gundribadi.	Do.	Tiliki ..	XIX-a 25–26	*13 / 23			Gundribadi	Do.	Tiliki. ..	XIX-a .. 25 26	*13 / 23					
				b	25						b	25					
					38	Third year cleaning.						38	Third year cleaning.	42 12 0	..	..	
				III 05–06	14 / 26	25th year thinning.					III 05–06	14 / 26	25th year thinning.	21 0 0	520	65	

Selection Working Circle.

Prescriptions of Working Plan.							Result of operations.								
Year of working. (1)	Felling Series. (2)	Range. (3)	Reserve. (4)	Coupe. (5)	Area. (6)	Nature of operation. (7)	Year of working. (8)	Felling Series. (9)	Range. (10)	Reserve. (11)	Coupe. (12)	Area. (13)	Nature of work done. (14)	Cost. (15)	Remarks. (16)
					ACS.							ACS.		RS. A. P.	
1930–31 ..	Russellkonda.	Russellkonda.	Baiballi ..	I	2,165	Selection felling.	1930–31	Russellkonda.	Russellkonda.	Baiballi ..	I	2,165	Felling and logging 4,854 c.ft.	151 11 0	
													Dragging 4,854 c.ft. ..	151 11 0	
													Miscellaneous ..	22 5 0	
													Total ..	325 11 0	
				II	2,085	Marking and climber cutting.					II	2,085	Marking and climber-cutting 256 trees.	5 4 0	
	Mojjagoda ..	Mojjagoda ..	Dharpengia.	I	749	Selection felling.		Mojjagoda ..	Mojjagoda ..	Dharpangia.	I	749	Felling and logging 8,403 c.ft.	262 10 0	
													Dragging 8,403 c.ft. ..	175 1 0	
													Miscellaneous ..	25 4 0	
													Total ..	462 15 0	
				II	591	Marking and climber cutting.					II	591	Marking and climber cutting 322 trees.	6 2 0	
1930–31 ..	Russellkonda.	Malati ..	Malati ..	IX	43	Demarcation ..	1930–31	Russellkonda.	Malati ..	Malati ..	IX	43	Demarcation with lines and stones.	8 2 0	
		Kontaipalli.	Kaliamba ..	IV	47	Do. ..			Kontaipalli.	Kaliamba ..	IV	47	Do.	9 3 0	
	Bontha ..	Jaganad-prasad.	Jaganad-prasad.	II	51	Demarcation.		Bontha ..	Jaganad-prasad.	Jaganad-prasad.	II	51	Do.	9 12 0	

Record of Works—*cont.*

Fire protection.

Prescriptions of Working Plan.

Year of working. (1)	Range. (2)	Areas to be: Rigidly protected. (3)	Partially protected. (4)	Unprotected. (5)	Total. (6)	Fire lines to be cleared and burnt. (7)
		ACS.	ACS.	ACS.	ACS.	M. F. CH.
1928	Russellkonda	9,479	33,854	9,059	52,390	153 0 6
	Mojjagoda	8,233	37,861	57,520	103,614	171 2 6

Result of operations.

Year of working. (8)	Range. (9)	Fire lines cleared and burnt. (10)	Rigidly protected: Number of fires. (11)	Area burnt. (12)	Partially protected: Number of fires. (13)	Area burnt. (14)	Unprotected: Number of fires. (15)	Area burnt. (16)	Total: Number of fires. (17)	Area burnt. (18)	Cost of fire protection. (19)	Remarks. (20)
		M. F. CH.		ACS.		ACS.		ACS		ACS.	RS.	
1928	Russellkonda..	153 0 6	2	652	2	66	5	4,264	9	4,982	820	
	Mojjagoda ..	171 2 6	2	12	4	2,270	6	542	12	2,824	1,215	

NOTE.—Fire protection operations commence in November and end in June. The cost of the whole operation for this period should be shown as well as the cost of special rewards given to the Kondhs of Pondakhol.

Miscellaneous.

Year. (1)	Range. (2)	Capital: Particulars of work done. (3)	Cost. (4)	Ordinary: Particulars of work done. (5)	Cost. (6)	Remarks. (7)
			RS. A. P.		RS. A. P.	
		Buildings—		Buildings—		
1929–30	Russellkonda.	....	..	Repairs to Forest Guard's shed at Gangapur.	35 0 0	
	Mojjagoda ..	Construction of kitchen to Ranger's inspection shed at Mojjagoda.	217 8 0	Repairs to kitchen of Circuit house at Russellkonda.	44 0 0	
				Repairs to Forest Guard's shed at Gudliguda.	59 13 0	
		Roads—		Roads—		
	Russellkonda.	....	..	Repairs to Khalagam road ..	850 14 0	
	Mojjagoda ..	....	..	Repairs to Rambha-Galleri road.	238 0 0	
				Repairs to Budli-Balabadi road.	26 0 0	
	Kukuluba ..	Improvements to Kutranalo bridge on Tilisingi-Tarasingi road.	1,260 0 0			

Name and Year Coupe X, 1929.   Regeneration Ledger.   Area (in Acres). 138 acres.   Miniari block Galleri R. F.

WORKING CIRCLE.

Plains Sal Timber, Felling Series I.   Compartment.—6.   Form No. 1.

Date. (1)	Particulars. (2)	Demarcation. (3)	Felling. (4)	Clearing. (5)	Heaping. (6)	Burning. (7)	Cutting back. (8)	Cleaning. (9)	Artificial regeneration. (10)	Climber cutting. (11)
		RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
March to May 1929.	Natural regeneration.	..	..	..	552 0 0	..	..	..	..	..
November 1929.	Coupe stones ..	13 12 0	..	..	..	..	..	..	..	..
September 1929 to March 1930.	First year cleaning.	..	..	..	..	..	..	407 4 6	..	..

Date. (1)	Thinning. (12)	Fire-protection. (13)	Miscellaneous. (14)	Overhead. (15)	Folio. (16)	Total. (17)	Revenue. (18)	Returns. (19)	(20)	Total. (21)	Remarks. (22)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.		RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
March to May 1929.	..	..	..	..	..	..	..	..	..	..	
November 1929.	..	..	..	..	..	..	..	..	..	..	
September 1929 to March 1930.	..	..	..	..	..	..	..	..	..	..	

APPENDIX X.

Vernacular Names of Flora and Fauna.

(*a*) Flora.

	Botanical name.	Oriya name.
1.	Acacia catechu ..	Khoiro.
2.	Acacia concinna ..	Shika.
3.	Acacia intsia	Danturi.
4.	Acacia leucophlœa ..	Guharia.
5.	Acacia sundra	Khoiro.
6.	Adina cordifolia ..	Holondho.
7.	Aegle marmelos ..	Belo.
8.	Alangium Lamarckii ..	Ankulo.
9.	Albizzia lebbek ..	Sirisi.
10.	Albizzia odoratissima.	Sirisi.
11.	Anogeissus acuminata.	Pasi.
12.	Anogeissus latifolia ..	Dhau.
13.	Antidesma diandrum ..	Nuniari.
14.	Bambusa arudinacea ..	Konto bamso.
15.	Barringtonia acutangulata.	Hinjolo.
16.	Bassia latifolia ..	Mowlo.
17.	Bauhinia racemosa ..	Ambata.
18.	Bauhinia vahlii ..	Shiali.
19.	Bombax malabaricum.	Buro.
20.	Bridelia retusa ..	Kosi.
21.	Buchanania latifolia ..	Charo.
22.	Bursera serrata ..	Soropotri mohi.
23.	Butea frondosa ..	Palaso.
24.	Butea superba	Palaso noi.
25.	Calichopteris floribunda.	Kukkundia.
26.	Careya arborea ..	Kumbhi.
27.	Caryota urens	Solopo.
28.	Cassia fistula	Sunnari.
29.	Cedrela toona	Mahalimbo.
30.	Chloroxylon swietenia.	Bheru.
31.	Cipadessa fruticosa ..	Ronabilli.
32.	Cleistanthus collinus ..	Korada.
33.	Cochlosperumum gossypium.	Pobosokoniari.
34	Dalbergia latifolia ..	Sissua.
35.	Dalbergia paniculata ..	Dhobi.
36.	Dendrocalamus strictus.	Salimbo bamso.
37.	Dillenia pentagyna ..	Rai.
38.	Diospyros embryopteris.	Dusera kendu.
39.	Diospyros melanoxylon.	Kendu.
40.	Eugenia jambolana ..	Jamo.
41.	Feronia elephantum ..	Kotto.
42.	Ficus bengalensis ..	Boro.
43.	Ficus religiosa	Ustho.
44.	Flacorurtia ramontchi.	Boincho.
45.	Gardenia turgida ..	Bamunia.
46.	Garuga pinnata ..	Handla mohi.
47.	Glycosmis pentaphylla.	Hanmircho.
48.	Gmelina arborea ..	Gombari.
49.	Grewia pilosa	Kulo.
50.	Grewia tiliæfolia ..	Dhamono.
51.	Holarrhena antidysenterica.	Kherua.
52.	Ixora parviflora ..	Kila kerua.
53.	Kydia calycina ..	Kopasia.
54.	Lagerstrœmia parviflora.	Sidha.
55.	Limonia acidissima ..	Bhenta.
56.	Mallotus philippinensis.	Sindaragundi.
57.	Mangifera indica ..	Ambo.
58.	Morinda citrifolia ..	Achu.
59.	Morinda tinctoria ..	Achu.
60.	Mucuna pruriens ..	Baidangua.
61.	Ochana squarrosa ..	Koniari.
62.	Odina wodier	Mohi.
63.	Oroxylu mindicum ..	Pomponia.
64.	Ougeinia dalbergioides.	Bandhano.
65.	Pavetta indica	Kattapengu.
66.	Phœnix sylvestris ..	Khojiri.
67.	Phyllanthus emblica.	Amla.
68.	Pongamia glabra ..	Koronjo.
69.	Pterocarpus marsupium.	Piasal.
70.	Pterocarpus santalinus.	Raktho chandano.
71.	Pterospermum acerifolium.	Bailo.
72.	Randia dumetorum ..	Potua.
73.	Santalum album ..	Chandano.
74.	Schleichera trijuga ..	Kusumo.
75.	Semicarpus anacardium.	Bhallia.
76.	Setaria glauca	Chono.
77.	Shorea robusta ..	Salua.
78.	Soymida febrifuga ..	Somi.
79.	Stephegyne parvifolia.	Mundi-mundi.
80.	Sterculia urens ..	Kodalo.
81.	Stereospermum chelonoides.	Pattuli.
82.	Stereospermum suaveolens.	Pattuli.
83.	Strychnos nux-vomica.	Kora.
84.	Strychnos potatorum ..	Kothoko.
85.	Tamarindus indica ..	Koia.
86.	Tectona grandis ..	Saguani.
87.	Terminalia Arjuna ..	Arjuno.
88.	Terminalia belerica ..	Bahada.
89.	Terminalia catappa ..	Badamo.
90.	Terminalia chebula ..	Horada.
91.	Terminalia tomentosa.	Sahajo.
92.	Woodfordia floribunda.	Jhattiko.
93.	Wrightia tinctoria ..	Kherua.
94.	Zizyphus xylopura ..	Gotto.
95.	Zizyphus Jujuba ..	Borokoli.
96.	Zizyphus œnoplia ..	Kontaikuli.

(b) Fauna.

	English name.	Oriya name.
1.	Elephant	Hathi.
2.	Tiger	Bagho.
3.	Panther	Koradapothri or sanno bagho.
4.	Wild dog	Bono kukuro.
5.	Bear	Bhallu.
6.	Sambhur	Samboro.
7.	Spotted deer	Jiadho.
8.	Barking deer or jungle sheep or muntjac.	Kuttura.
9.	Mouse deer or Indian chevrotain.	Gurandia.
10.	Black buck	Harino.
11.	Bison	Garalo.
12.	Wild buffalo	Bono moishi.
13.	Nilghai	Gudango.
14.	Pig	Bhara.
15.	Porcupine	Jikko.
16.	Mongoose	Nevulo.
17.	Pangolin or scaly anteater.	Goi-sappo.
18.	Malabar squirrel ..	Patto musa.
19.	Monkey	Monkudo.
20.	Snake	Sappo.
21.	Pea fowl	Mayuro.
22.	Jungle fowl	Bono kukkuda.
23.	Spur fowl	Do.
24.	Green pigeon	Horada.

APPENDIX XI.

List of Working Plan Maps on the scale of 4 inches = 1 mile.

(a) List showing the District Forest Office number and the corresponding Survey of India number

District Forest Officer number.	Survey of India number.	District Forest Officer number.	Survey of India number.
1	389, S.E./1, 2, 3 and 4.	26.	379, N.E./2.
2.	389, N.E./4, S.E./2 and 395, S W./1.	27.	378, S.E./4.
3.	389, N.E./3 and 4 and S.E./1 and 2.	28.	378, S.E./2.
4.	388, S.E./4 and 389, N.E./2 and 4.	29.	378, N.E./4.
5.	Manuscript map.	30.	378, N.E./2.
6.	Do.	31.	389, S.E./3, 390, N.W./2 and N.E./1-part.
7.	Do.	32.	390, N.W./2.
8.	Do.	33.	389, S.W./4.
9.	389, N.W./2.	34.	389, S.W./2 and part of S.E./1.
10.	389, N.E./1.	35.	389 S.W./3.
11.	388, S.W./4.	36.	389, S.W./1.
12.	388, S.E./3.	37.	389, N.W./3.
13.	388, S.W./2.	38.	390, N.W./1.
14.	388, S.E./1.	39.	380, N.E./2.
15.	388, N.W./4.	40.	379, S.E./4.
16.	388, N.E./3.	41.	379, S.E./2.
17.	388, N.W./2.	42.	380, N.E./1.
18.	388, N.E./1.	43.	379, S.E./3.
19.	387, S.W./4.	44.	379, S.E./1.
20.	387, S.E./3.	45.	379, N.E./3.
21.	Manuscript map.	46.	380, N.W./2.
22.	388, N.W./3.	47.	379, S.W./4.
23.	388, S.W./1.	48.	379, S.W./2.
24.	388, S.W./3.		
25.	389, N.W./1.		

(b) List showing the maps relating to each reserve.

Reserve.	Number of sheets (District Forest Office numbers.)
Russellkonda Range.	
Malati	32 and 33.
Kaliamba	34, 36 and 37.
Tiliki	25 and 37.
Baiballi	24, 25, 26 and 27.
Kullada	9, 11 and 25.
Kumarasuni ..	34.
Binodia	34.
Tangarai	31 and 33.
Sondasolia	31.
Mojjagoda Range.	
Galleri	9, 11, 13, 23, 24 and 25.
Rambha	22, 23, 28, 29 and 30.
Dharpangia ..	23, 24, 27, 28 and 29.
Dhimirijoli ..	15, 22 and 23.
Chokkapad ..	21.
Kukuluba Range.	
Chandragiri ..	11, 13 and 15.
Chodiapalli ..	13.
Ambazora	13, 15, 16, 17, 18 and 19.
Gundribadi ..	17, 18, 19 and 20.
Bontha Range.	
Jaganad-prasad ..	9, 10, 11, 12 and 14.
Brahmansai ..	11, 12, 13 and 14.
Paichalia	14 and 16.
Gogodo	16 and 18.
Buguda Range.	
Kriamba ..	1 and 2.
Kurcholi—A. ..	3.
Kurcholi—B.	2.
Panchabhuti	2 and 4.
Sollundi ..	5.
Nagari	7.
Kuddapada ..	3.
Chamunda	8.
Budrungu	6.
Surada Range.	
Rogoda	35, 36, 37, 40 and 41.
Vinjigiri	35 and 38.
Dumu Dumi ..	33 and 35.
Raipada	38, 39 and 40.
Hukuma	39 and 40.
Bondagocha ..	40 and 41.
Pippalaponka ..	40, 41, 43 and 44.
Mundapitta ..	39, 40, 42 and 43.
Dheppaguda ..	39.
Pondakhol Range.	
Dhowgam	41 and 44.
Dabuki	41.
Pondakhol	41, 42, 43, 44, 45, 46, 47 and 48.

APPENDIX XII.

Working Plan Key Map on the scale of 1 inch – 1 mile.

See pocket in cover.

Proceedings of the Chief Conservator of Forests

Proceedings No. 311, Press, 8th July 1932

Working plan—Revised—Ghumsur Forests—Ganjam district—Sanctioned.

R. D. RICHMOND, Esq., C.I.E., I.F.S.,
Chief Conservator of Forests.

READ—the following papers :—

I

Revised working plan for the Ghumsur Forests of Ganjam district.

II

G.O. Ms. No. 877, Development, dated 29th June 1932

Read—the following paper :—

From the Chief Conservator of Forests, No. 4029/C-1/31, dated the 18th May 1932.

Order—Ms. No. 877, *Development, dated* 29*th June* 1932.

The Government sanction the revised Working Plan for the Ghumsur Forests of Ganjam district submitted by the Chief Conservator of Forests with his letter read above.

(By order of the Governor in Council)

S. H. SLATER,
Secretary to Government.

To the Chief Conservator of Forests.
Copy to the Superintendent, Government Press.

Proceedings—No. 311, Press, dated 8th July 1932.

Recorded.

R. D. RICHMOND,
Chief Conservator of Forests.

(True copy)

V. G. DARRINGTON,
Personal Asisstant.

To the Conservator of Forests, III (Working Plans) Circle.
,, Conservator of Forests, I Circle.
,, District Forest Officer, Ganjam.

Copy to the other Conservators and District Forest Officers, including the Special Forest Officer, Parlakimedi Maliahs.
,, Principal, Forest College.
,, Provincial Sylviculturist
,, Working Plan Officers.

The following amendment is issued to the Revised Working Plan for the Ghumsur Forests of the Ganjam division sanctioned in C.C.'s Proceedings No. 311 Press, d. 8-7-32:-

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Pages 112-113. Paragraph 278- Add the following after the second

sub-~~pagrap~~ paragraph:-

" One of the 5 acre plots detailed in the second sub-paragraph will continue to be dealt with as therein ordered but the treatment of the secondwill be modifiedas follows:-

Plot II will be burnt annually in April for 5 years. If the sal seed year in May-June following the burn inthe fifth year is a good one, the area will be rigorously protected for the three subsequent years, but should the seed year in the fifth year be poor, the area will be burnt again in the sixth year and until a good seed year occurs. Itwill be for the District Forest Officer to decide if the seed yearis sufficiently good and order accordingly.

This cycle (five years annual burn followed by three years ~~/~~ rigorous protection after a good seed year) will be continued during the period of theexperiment.

The object of this modification is to give sal seedlingsa little more time to establish themselves before thenext burn, when it is considered that a much higher proportion will survive the burns.

C.K.G. 4-4-34.

Plot 3.—1 chain × 1 chain = 1 square chain. Selected sal deed was dibbled in June 1928. Enumerations were made in August 1928 and July 1929. The enumeration made in July 1929 showed 2,069 sal plants.

Plot 4.—1 chain × 1 chain = 1 square chain. Selected sal seed was sown broadcast in June 1928. Enumerations were made in August 1928 and July 1929. The enumeration made in July 1929 showed 875 sal plants.

Plot 5.—$\frac{1}{2}$ chain × $\frac{1}{2}$ chain = $\frac{1}{4}$ square chain. Sixty-four sal stumps made from natural switches were planted in June 1928. Enumeration in July 1929 showed 58 plants alive and 6 plants completely dead.

Plot 6.—2 chains × $2\frac{1}{2}$ chains = 5 square chains. Opened as control plot. Enumerations were made in April 1928 and July 1929. The enumeration made in July 1929 showed 1,074 sal plants.

If the results already obtained are to be of any practical value it is necessary to pursue the investigation in order to find out to what extent the seedling regeneration produced in 1928 will develop into the switch stage and whether this development can be attained within a reasonable time. For this purpose the experimental plots will be kept under further observation. Careful enumerations shall be made periodically every two years distinguishing switch growth from the rest of the seedling regeneration. The seedling regeneration is further to be classified under current year's seedlings and survivals. The enumerations shall be made in the middle of July by a Gazetted Officer and the results are to be properly recorded. The next enumeration will be due in July 1931.

277. *Observation plot relating to teak.*—The teak plantation of about 1 acre situated in Coupe I hall be maintained as an observation plot for the purpose of studying the rate of growth of teak. Twelve trees have been selected and their measurements of girth and height were recorded in March 1929—Vide paragraph 187 of Part I. The trees shall be measured periodically once every five years and the rate of growth recorded correctly. The next measurement will be due in March 1934.

278. *Further experiments on sal regeneration.*—It is desirable to explore all possible avenues by which sal regeneration may be increased in areas of good soil that appear to be poorly stocked with sal advance growth in the switch stage. An interesting article has recently appeared in the Indian Forester of June 1930, from the pen of Mr. E. A. Smythies, I.F.S. The open Nepal forests containing prolific sal regeneration are compared with the dense forests of the Haldwani division which are impossible to regenerate naturally from seed. Mr. Smythies suggests that moderate to light shade combined with frequent burning is likely to produce conditions which are favourable to the establishment of sal regeneration. It is further emphasized that the suggestion applies only to the well drained good quality sal forests growing on moist fertile loam and not to the dry poor quality grounds or hard clay soils. In applying Mr. Smythies' ideas to Ganjam, it is to be remembered that the conditions prevailing in Ghumsur are different in many respects, from those in Haldwani. The forests of the Ravine Working Circle are frequently burnt over by hill fires and we have no problem of the evergreen weeds and shrubs invading the ground.

An experiment shall be carried out by the District Forest Officer on the following lines:—In Ravine Compartment 2 of Kriamba Reserve two plots of 5 acres each shall be laid out in areas deficient in sal regeneration. The two plots should be situated widely apart and must be selected personally by the District Forest Officer. In each 5-acre plot, three small observation plots of 1 chain square shall be opened at some distance from each other with the object of enumerating periodically the sal advance growth. A control plot of 2 or 3 acres shall also be demarcated by the side of each 5-acre plot. The canopy of each experimental plot will be opened up to such an extent as to create a light to moderate shade on the ground. The sal advance growth shall then be enumerated in all the observation plots and the results shall be recorded, carefully distinguishing seedling regeneration from switch regeneration. A fire will be put through the two 5-acre experimental plots during the month of May.

and pole stage have been discarded. For, the exceptional increments are those put on by young saplings and poles hastening upwards to fill gaps in the upper storey. A correct understanding of sal has been delayed by the fact that early literature on the subject emanated principally from Dehra Dun. There, frost is experienced ; and it was considered consequently that sal regeneration was to be protected by overhead shade. The erroneous view followed that sal was a shade-bearer, and that it could therefore be grown satisfactorily under the selection system. The dying back of small sal plants was accounted for by the ingenious theory that a sal plant was intended by nature to die back annually until its roots reached permanent spring level.

56. *Development of the root system.*—As regards the root development of sal, the tap root descends vertically through the underlying soil layers until it reaches the lowest depth at which the bed rock is fissured. Thereafter it serves to anchor the tree firmly in the soil. The horizontal feeding roots are developed practically in the top alluvium layer. This explains the direct relation that has been observed to obtain between the quality of a sal crop and the depth of the soil alluvium on which it grows.

57. *Division of plains sal forest into quality classes.*—The primary division of the Ghumsur forests dates from 1903 to 1906. Under the prescriptions of the first working plans, the best plains sal areas were formed into blocks by means of cleared fire lines with a view to introducing systematic fire protection. The block lines enclosed sal forest of every grade and condition as well as areas destitute of sal. For Mr. Minchin's Working Plan, the sal forest contained in the old blocks was stock-mapped and allotted to three quality classes. The classification depends upon height growth. Quality I is sal forest in which mature trees attain a height of 90 to 110 feet. In quality II, mature trees attain a height of 70 to 90 feet. Quality III is sal forest of height growth inferior to that of Quality II. It was intended to apply a clear-felling system to the first and second quality sal forests containing sufficient advance growth, regenerating according to the Gorakhpur principle. To the third quality sal forest poor in respect of height and generally in bad condition, the simple coppice system was to be applied.

The stock-mapping of the quality classes was done by ocular estimate without the aid of height measuring instruments. In qualities I and II, the relatively mature and young woods were distinguished separately and given different compartment numbers on the maps. This involved numerous small subdivisions of a compact piece of forest and led to much scattered working. Most of the mature woods have either been clear-felled or subjected to the extraction of mature trees during the past eleven years. The distinction between mature and young woods cannot now hold good for the greater part of the forests, and even before, the differences were hard to make out. The stock-maps have therefore been revised to show the first and second qualities in green and yellow and the third quality in pink. The third quality sal forest has, for the purposes of this working plan, been remapped in great detail in all those reserves where there is a possibility of working of felling series.

The Central Silviculturist at Dehra Dun has drawn attention to the desirability of the quality classes in sal forest conforming to one standard throughout India, and has stated that the standard adopted in Indian Forest Records (Silvicultural Series), Volume XII, Part IV " Yield Tables for clear-felled sal Coppice " by S. H. Howard, is, in his opinion, the most suitable. It is however not desirable, with the insufficient data available for Ganjam sal, to adopt these quality classes in the present working plan. At its revision in ten years' time, an endeavour should be made to conform with the standard adopted in the rest of India, whatever that may be at that time."

(i) First and second quality sal forest.

58. *General description of the natural forest.*—* " The first and second qualities will be taken together for purposes of description. The forest is in an irregular state. The age classes are represented in incorrect proportions

and a large part of the crop is unsound. The density is generally too great to permit the younger sal to develop. The dominant trees have completed the height growth of which they are capable, and have insufficient space for their crowns. The absence of any troublesome kind of undergrowth, the almost complete absence of grass and the healthy condition of the soil are matters for thanksgiving. In the matter of density in the second quality crops there are some variations, according to locality. The yield that may be expected from mature second quality areas in Surada range is estimated to be 40 per cent less, and in Buguda range 30 per cent less, than that of other ranges owing to the more open nature of the crop in these two ranges. In the mature first quality there is no great variation in the volume of timber per acre.

59. *First quality sal.*—The first quality mature sal trees vary in height between 90 and 110 feet. The great majority of first quality trees over 5′ 6″ in girth are either unsound or show signs of the commencement of unsoundness. The ' physical rotation ' appears to correspond with a girth of about 5 feet. The sal crops of the future may with proper tending remain sound to larger sizes, but we cannot count upon this. The first quality is distinguished by boles free of branches to a respectable length, 40 to 60 feet in the case of stems over 4′ in girth. The present crop has grown up under unfavourable circumstances, and in a well tended, uniform, crop a length of at least 60 feet should be attainable.

60. *Second quality sal.*—Mature second quality sal trees attain a height of about 70 to 90 feet. In early years the rate of height growth seems to be much the same as in the first quality. Statistics on this point are however inadequate. The length of clear bole for stems over 4′ in girth in the second quality is 40 to 45 feet. Both in first and second quality, the sal, whether sound or not, has generally managed to grow straight. It is an agreeable sight to those accustomed only to the mixed deciduous forests of Madras Presidency.

There is a distinct difficulty in finding in second quality forest, completely sound sal stems over 4′ 3″ in girth. In the case of an easily accessible forest this might be due to removal of sound 3′ stems previous to 1900 under the ' permit system.' In unmolested and remote forests however the rule still holds good. Stems of 4′ 6″ in girth of healthy outward appearance and free from wounds of any sort, have generally at their centres, the beginnings of unsoundness. The ' physical rotation ' in the second quality appears therefore to correspond to a girth of about 4′ 3″. In coming to a conclusion as to the girths corresponding to the ' physical rotation ' in first and second quality sal, the Working Plans Officer has been guided by the experience of Rangers who have conducted fellings of sal in this locality in unreserves adjoining the sal blocks of the reserved forests, as well as by his own experience during several years of collection of statistics."

61. *Undergrowth.*—Of the species that form the natural undergrowth the principal ones are sal, *Buchanania latifolia, Ixora parviflora, Cipadessa fruticosa, Antidesma diandrum, Phyllanthus emblica, Grewia pilosa* and *tiliaefolia, Flacourtia ramontchi Morinda citrifolia, Holarrhena antidysenterica, Ochna squarrosa, Eugenia jambolana, Terminalia tomentosa, Chebula* and *belerica, Woodfordia floribunda, Diospyros melanoxylon, Bridelia retusa, Cleistanthus collinus, Schleichera trijuga* and others. An analysis made by Mr. Minchin of a sample plot, 1/40th of an acre, in Suradevi showed that sal advance growth was present to the extent of 30,000 per acre and other species about 8,000.

62. *Nature of sal regeneration.*—* " Up to 1902 when the first working plans were prepared, fire protection had been non-existent, and the sal forests were also open to grazing. The state of the forest in regard to regeneration was apparently extremely bad. The effect of a few years' protection, from 1903 onwards, was to produce an abundant crop of sal regeneration beneath the high forest. Much of this growth arose from what is called " fire coppice " and a great deal of it came from seed.